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RESEARCHES AS TO THE END RESULTS IN TWENTY-FIVE CASES OF TUBERCULOSIS OF THE KIDNEY TREATED WITH NEPHRECTOMY

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THE number of nephrectomies for tuberculosis at the surgical clinic of Lund until October 1, 1910, is twenty-five. I have recently been engaged in making inquiries about the present condition of these operated patients, and have succeeded in getting reliable information about all of them. The result of the researches is thus without gaps. Besides, I have had an opportunity of personally examining a great number of these patients.

All still living except two have survived the operation more than a year. A year is certainly not sufficient to decide whether an operated tuberculosis of the kidney is cured or not, but as Krönlein has emphasized, a certain reliance may be placed upon a cure for this length of time, inasmuch as the experience hereto gained seems to indicate that operated persons who have survived the first year after the operation as a rule remain cured. Those, on the contrary, who on account of the nature and extension of the tuberculosis or its complications have no hope of recovery, generally die during the first year after the operation.

As regards the mortality, seven are dead and eighteen still living. Four have died in their homes and three in the clinic. Concerning the four first mentioned the respective ministerial offices or the relations have stated the following facts: One died of "tuberculosis," seven months after the operation; one died after "long staying in bed and severe pain" three and a half years after the operation; one died scarcely a year after the operation; one died two months after returning home. The three remaining died in the clinic respectively five weeks, six weeks, and six months after the operation. It must be remarked contrary to Krönlein that one of the seven patients did not die during the first year, but lived three and a half years after the operation.

As to the cause of death it should be observed that no one has died because of the operation and no so-called "kidney death" has occurred. In all the cases the opposite kidney has functionated satisfactorily and adequately.

Concerning the cause of death of the four patients who died at home one must be careful of one's judgment. In three of the cases it seems to be beyond doubt that the cause of death was tuberculosis, especially when the statement of the death and the time of death is compared with the condition of the patient, when he left the clinic. However, in the fourth case, which survived the operation three years and a half, the cause of death is uncertain.

As to the cases that died in the clinic and consequently had a postmortem, several interesting observations should be noticed.

CASE 16. Died six weeks after the operation. Had diffuse tuberculosis in the unhealed wound; furthermore tuberculosis in the bladder and the prostate; the ureter stump was thickened and had small elevated nodules inside. The tuberculosis in the bladder was localized to the operated (right) side and in the corresponding opening of the ureter there were numerous small bulbs and beginning ulceration. The left kidney and corresponding ureter were absolutely normal. In the right lung was a nest of tubercles.

CASE 18. Died six months after the operation. The wound was unhealed and filled with tubercular granulations from which the tuberculous right ureter was easily isolated (having been sewn up during the operation). Tuberculosis in the bladder with larger and smaller superficial ulcerations. The opening of the left ureter was strictured, the ureter above the stricture obviously dilated, not so the pelvis; the left kidney normal; the prostate destroyed by tuberculosis. In the lungs and the bowels there were widely spread changes of tuberculosis.

CASE 24. Died five weeks after the operation. The wound healed primarily and was absolutely free from tuberculosis. Nothing remarkable in the ureter stump, some tuberculosis in the bladder; the remaining kidney and corresponding ureter normal. Tuberculous meningitis. Tuberculosis in the lungs and bronchial glands; miliary tuberculosis in the spleen.

That the three above mentioned died from their tuberculosis, seems to be quite clear; the two first mentioned undoubtedly because of the diffusion of the tuberculosis. The proximate cause of the death of the third patient was an acute tuberculous meningitis, which developed about three weeks after the operation, when the wound was healed and the patient out of bed, and which resulted in death after two weeks.

In the cases here recorded the appearance of the tuberculosis in the urinary organs is of the greatest interest. It is especially remarkable that in spite of very diffuse tuberculosis in the different organs, in spite of bladder tuberculosis, etc., the opposite ureter and the corresponding kidney were quite normal in two of the cases. The third one is perhaps still more interesting. In this case the lower end of the remaining ureter was strictured, moreover the ureter above the stricture was dilated, with pelvis and kidney normal. These observations, put together, show that the remaining kidney is not much subjected to the danger of an arising infection. Should such a one, however, appear, the third case gives a hint as to how it will probably behave. The lower end of the ureter will be strictured and the urine from the other kidney stagnates in the dilated ureter. The tubercular bacilli that under such circumstances make their way into the ureter from the bladder need not go against the stream. In the urine stagnating in the ureter they may easily, especially when the patient is lying on his back, be brought upwards into the renal pelvis and nest in their usual favorite place, the lips of the papillæ.

Concerning the more particular localization of the stricture in the lower part of the ureter, one detail has a certain theoretical interest. It seems evident from the examination made at the section and quite undoubtedly from the postmortem report, that the tuberculosis in the bladder was spread over the whole trigonum; consequently the tubercular stricture in the ureter had arisen because the bladder tubercules had involved the very opening of the ureter and strictured it, and that the ureter outside the bladder was not strictured, but, on the contrary, dilated. It is interesting to note this concerning the case in question, as certain authors are of the opinion that the transferring of the tuberculosis in the opposite kidney would take place outside the bladder, and consequently, that the stricture would have its site in the extravesical part of the ureter. This case forms no basis for such a theory.

WOUND HEALING

The results of the wound healing by nephrectomy for tuberculosis have a certain interest, as it is known and acknowledged that this healing is often complicated and that it is difficult to get a spontaneous primary healing of the wound even when the technique is good and the aseptic conditions satisfactory. To proceed with the greatest caution when taking

out the kidney so that it is extracted whole and uninjured is of course an indispensable condition for a good healing. More discussed and worth discussion is the question as to how the ureter is to be treated, as it is practically always tuberculous. John Berg, as early as 1899, discussed this subject at the meeting of the Northern Chirurgical Association and treated it in detail in a paper written the same year (Hygiea, Oktober, 1899). To this very day no conformity seems to have been established as to the treatment of the ureter under different circumstances.

In my cases the procedure has varied. In some of the cases the ureter has been sewn up in the lower angle of the wound. In these cases the healing has proved the most unsatisfactory, probably not so much as a result of the method as because of the fact that in these particular cases the ureter was most seriously involved. Moreover, in other cases I have tried, by means of the lumbar incision and without essentially extending it, to lay bare the ureter as much as I have been able to and take away as large a piece of it as possible. As in this manner only a part of the ureter can be removed and consequently a large bit of it is left behind in the pelvis, I have not extended these experiments further, but instead have divided the ureter in a place where I can easily place two ligatures. I have thus, by burning off the ends and closing them with ligatures, with the utmost care tried to prevent the contents of the ureter from making their way into the wound. I have left the tuberculosis in the ureter to heal up spontaneously, hoping that the tubercular secretion that might possibly develop in the remaining bit of the ureter might find its way to the bladder.

The technique has thus been: Lumbar incision through the skin and muscles. Exceedingly cautious loosening of the kidney. After that seeking out and isolating the ureter in the lower part of the wound. Double ligature. Burning off the ureter. The upper end of the ureter is drawn upwards and loosened up to the kidney. After that the renal vessels are ligated, carefully isolated from the pelvis, and ureter and kidney are taken out. Drainage with a tube of india-rubber. No gauze packing. Suturing of the muscles and skin. The vessels ligated with silk. The muscles were in the first years sutured with silk, nowadays with catgut. It is a fact that primary healing has lately oftener occurred, less, perhaps, on account of a better technique than owing to the circumstance that the cases are now usually operated upon at an earlier stage of the disease.

All the twenty-five cases are available for judging the result of the wound healing, as they all lived five weeks or more after the operation. When surveying the cases one perceives that a perfect primary healing with a complete closure of the wound within a fortnight, and the wound permanently healed afterwards, has taken place in eight cases. In two cases the wound was completely healed within four to five weeks after the operation and afterwards remained healed. In one case the wound was healed when the patient was discharged five weeks after the operation. The patient died at home a couple of months afterwards. It is not known if the wound was still healed. In one case the wound healed two months after the operation and afterwards remained so. In four cases the wound healed from the beginning almost primarily, and was nearly healed when the patient left the hospital. It opened, however, soon after coming home, suppurated, and in two cases did not heal definitely till about a year afterwards. In the third case it did not heal until more than two years after the operation. In the fourth case the patient died some three years afterwards in his home; if healed or not is unknown.

In the remaining nine cases the healing was from the beginning per secundum. Six of these died with unhealed wounds within some weeks or months of the operation. One who was operated May, 1910, is up to this time unhealed but out of bed and in fair health. A woman, operated in February, 1907, had, on examination June 29, 1910, a small fistula in the scar that secreted some drops of fluid. The four remaining patients are definitively healed — after having for a long time suffered from continual fistulæ — after respectively one and a half year, two and a half years, two and three-quarters, and three

years. It is difficult to say if the prolonged suppuration and fistula formation in these cases has depended on tuberculosis or "ligature suppuration," or on both.

It is certainly more probable that the fistulæ in these cases are derived from tuberculosis in the ureter stump, if the process lasts for years.

The suppuration and the fistulæ have not in these cases interfered with the patients' usual work.

As to the wound healing, the results reached, being carefully criticized, are thus about mediocre. In about half of the cases the wound healing has extended over months and years. Now and then it has quite failed. It is certainly obvious that a careful technique and asepsis is here as always an important factor. I am, however, persuaded that a happy result can be reached only when the operation is undertaken at an early stage of the disease. An early operation in tuberculosis in the kidney is certainly of importance since it gives the best warrant for a good healing per primam.

When the wound has healed satisfactorily there has never in my cases occurred any difficulties with regard to the scars, no weakness, no hernia (rupture), etc.

We shall now observe the end results. Here as elsewhere it is scarcely possible to speak of a definite curing of the tuberculosis in organs necessary for life.

Absolute release from symptoms from the urinary organs, a fairly good condition with increase in weight and physical strength and unbroken power of work must, however, be considered as a definite recovery provided one refers to the previous diseases. One cannot attach importance to what may possibly be latent.

Out of our twenty-five cases, seven have died, and two have been operated during the last year. This leaves sixteen for judging as to old cases. Out of these cases nine may be considered as completely recovered, and seven as not quite recovered.

The nine cases that can be considered as quite recovered have survived the operation as follows:

In one case, five and a half years.
In two cases, four years.
In one case, three years.
In one case, two and three-quarters years.
In one case, one and one-half years.
In one case, one year.

Out of these nine cases I have been able to examine seven myself. As to the remainder, one, a sick-nurse, has been examined by a physician, who afterwards told me the result. Another, an apothecary's assistant, has examined his urine himself, and by letter told me the result, as well as his condition in other respects. I have thus secured absolutely trustworthy records about all these cases. The urine is free from albumen and looks clear in every case but one, where it was somewhat opaque when examined. The urine was discharged without trouble and with about normal frequency, according to the respective patients' own records. It appears, however, as if the patients had developed the habit of urinating somewhat oftener than usual. Two of them inform me that they get up once during the night for that purpose. If one fills the bladder in order to do cystoscopy, one also perceives that the bladder cannot without pain receive a great quantity of fluid. In two cases the pain was stated to take place after injecting 200 to 300 cm.

By cystoscopic examination the inside of the bladder appears normal except in three cases. In two cases the bladder fundus was somewhat redder than usual. In one case the ureter ostium was also obviously reddened.

Their general condition seems fairly good and they are all going about their work just as before they were taken ill. A considerable increase in weight has been observed in several of the cases, in one up to sixteen and a half kilograms. I am of the opinion that one can have a right to regard all these as completely restored.

Concerning the second series of cases, which has been designated as "not quite recovered," a more detailed description of each special case is required in order to get a view of the results up to the present day, and especially of what one can expect of these cases in the future. I have recently had the opportunity of personally examining five

of them. From two of the patients I have lately had news by letter only.

In one of the cases (3) eight years have passed since the operation. The patient, a woman, now aged 29, has been married four years, is childless, feels well and strong, is stout, has good physical strength and has the management of her house. The desire to urinate is somewhat increased and the bladder cannot without discomfort be filled for cystoscopic examination. The urine is clear but shows a faint trace of albumen; no tubercular bacilli in the centrifuge. In the cystoscope the bladder wall looks strangely striped with red with paler intervals. On the operated side the ostium is deep red; around it there are some gray white spots (probably scars).

In the second similar case (4) which refers to an unmarried woman now aged 27, six and a half years have passed since the operation. Her general condition is fair and she is able to work but she suffers from an increased desire to urinate about every two hours both night and day. The urine is somewhat turbid, contains one-fourth of one per cent albumen. In the sediment there are leucocytes. Repeated seeking for tubercular bacilli gives negative result. The bladder can easily and without discomfort be dilated and the bladder wall appears in the cystoscope to be normal, excepting the ostium on the operated side, where it is reddened and the mucosa around it shriveled. The left ostium is oddly patent and around it there are white elevated points but no reddening. The catheter is obstructed in its passage some mm. from the ureter ostium.

It is obvious that one cannot speak of perfect health in any of these cases in spite of the long time that has elapsed. The cystitis appears to be healed but the condition of the kidney is uncertain (alb.).

In two cases (7, 11), both men, respectively five and four years have elapsed since the operation. The symptoms of cystitis have been very painful, and, judging by letters, the remaining symptoms are also due to the cystitis.

Both of them are able to do some work and have increased in weight. They suffer still from an increased desire to urinate and their urine is turbid. Both report an obvious improvement during the last year.

A woman, operated three and a half years ago, has a small superficial fistula in the scar. When examined June 29, 1910, she was gravid in the sixth month. Has somewhat increased desire to urinate (twice during the night). She has absolutely no pain on urinating. The urine shows trace of albumen and has leucocytes in the centrifuge. Her general condition is fair. She has entire management of her house. I am of the opinion that this woman can be regarded as absolutely well since the trifling symptoms from the urinary organs may possibly be due to the gravidity or be connected with it, and the fistula in the scar is of no consequence.

A woman, aged 22 (14), operated three years ago, had in the beginning an exceedingly troublesome cystitis and recovered very slowly. When examined this year, her general condition was fair, and she had increased in weight fourteen kilograms. She has a trying situation with whole time duty as teacher in a mixed school. Urinates twice during the night, by day at four hour intervals. The urine sometimes clear, often opaque, shows a faint trace of albumen.

The bladder receives only a small quantity of fluid. On trying to inject a greater quantity the patient feels great pain. In the cystoscope the mucosa seems red and swollen; no ulceration. The case appears to be slowly recovering.

The seventh and last case of this series (17) is a sick-nurse aged 26, operated somewhat more than a year ago. That case did not appear to be successful during the first months after the operation, but she gradually recovered. Her general condition is improved and an increase in weight of twenty-one kilograms is reported to have taken place. During the summer of 1910 she was employed as nurse at a seaside sanatorium. Discharges urine once during the night. The urine is free from albumen but not quite clear.

From this general survey of the seven cases it may be gathered that, though they still cannot be considered quite restored, we cannot in any one of them exclude the possibility that

perfect health can be regained, and that in some of the cases it is very probable that this will happen. Least promising are, however, the two cases where seven or eight years have passed without regaining their health.

As to the present condition of the two cases that were operated within the last year, it can be stated that the one case (23) operated April 2, 1910, is much improved, but cannot yet do his ordinary work. The urine is discharged without pain but rather frequently. Had, when discharged, a very painful cystitis, but appears to be making a good recovery.

The second case, operated May 31, 1910, (25), was discharged not quite healed but in fairly good condition. Had increased in weight eight kilograms after the operation. The cystitis was still troublesome but the urine was generally clear and showed only a faint trace of albumen.

CONCLUSIONS

I have no reason to enter upon an examination of other questions than those of the results. I must, however, in a few words recapitulate that out of our twenty-five cases there have been ten men and fifteen women. The right kidney was affected in seventeen cases and the left in eight. The youngest of the patients was thirteen years old and the oldest fifty-seven. The average age was thirty years.

If the end results are summed up, the matter stands as follows:

Dead, seven cases; six of them certainly from tuberculosis.

Recovered, nine.

Improved, nine.

Not improved, none.

These results put together with like results previously communicated by Israel and Krönlein seem to indicate that one must count on a mortality of twenty-five per cent, but that the remaining seventy-five as a rule have good prospects of regaining full health through the operation. Krönlein has recorded health eighteen years and Israel fifteen years after nephrectomy for tuberculosis in the kidney.

SUPRAPUBIC TRANSCYSTIC REMOVAL OF CALCULI IMPACTED IN THE PORTION OF THE URETER WHICH IS SITUATED IN THE BLADDER WALL

By W. J. MAYO, M. D., Rochester, Minnesota

FROM June 1, 1899, to May 1, 1911, eighty-two stones were removed from the ureter by operation in St. Mary's Hospital. Of this number twenty-two were within one and one-half inches of the origin of the ureter in the pelvis of the kidney, forty-eight were in the terminal ureter, that is, within an inch and one-half of the bladder, eight were situated at various points along the course of the ureter, and four were not classified in the records as to their position. We have not found the so-called second point of narrowing of the ureter, which is supposed to be near where it crosses the iliac artery, to contain impacted stone more frequently than any other point along its middle course. Stones in that portion of the upper ureter which lies above the iliac crest, we have generally removed through a posterior extraperitoneal lumbar incision.

Usually it is not difficult to remove stones from the ureter in its exposed portion from below the ribs to the bladder wall through an anterior extraperitoneal incision. The ureter is exposed and held between the thumb and finger, and a longitudinal incision is made over the stone for its removal. The ureter is sutured with fine catgut, but if the operative field is deep and the ureter difficult of access, suture may be omitted as it is not essential.

As a matter of fact there is seldom urinary

leakage whether the ureter is closed by suture or not, drainage by means of strips of folded rubber tissue is provided to guard against soiling or leakage. The escape of a small amount of acid urine does not interfere with the process of tissue repair unless the urine is infected. Gauze should not be used for drainage material, as upon removal it may leave a urinary fistula. In a number of instances we have adopted the suggestion of Gibbon and opened the peritoneal cavity to enable accurate localization of the stone and to assist extraperitoneal removal.

Stones which are situated in the bladder segment of the ureter are the most difficult to remove, and the opening in the duct must be carefully sutured to prevent urinary leakage, as not infrequently the bladder wall is injured.

In sixteen instances Braasch has been able to remove stones impacted in the lower portion of the ureter through the operating cystoscope, or when the stone could not be removed in this manner, he has made an attempt to assist spontaneous evacuation by dilating the lower end of the ureter up to the point at which the stone is lodged, and injecting sterile oil above. In several of these cases the stone was passed spontaneously within forty-eight hours. In many cases the impaction was so great that none of these measures were effective and we have removed the calculus through a low muscle-splitting extraperitoneal incision. This operation was often difficult and in several cases the bladder was injured requiring careful suture. In four cases at Braasch's suggestion, we have made a suprapubic incision, opened the bladder and with a finger in the bladder and the thumb in the cellular space outside the bladder wall against the lower end of the ureter, the stone has been readily forced into the bladder. Sometimes a pair of forceps has been used to dilate the ureteral orifice in front of the advancing stone. This method has been so simple, safe and satisfactory that we consider it superior to any we have heretofore practiced for the removal of impacted stone in the terminal ureter.

After removing the stone or stones, the suprapubic opening in the bladder is sutured in layers with fine catgut. In closing the abdominal incision we have usually made provision for drainage of the space of Retzius by carrying a folded strip of rubber tissue down to the suture line in the bladder wall, but in none of the cases was there leakage of urine. The patients left the hospital in from eight to twelve days with healed wounds.

The cases which were found most suitable for this operation were those in which the impacted stone could be detected with the cystoscope, either by sight of the stone itself or as a small tumefaction just above the ureteral orifice.

Unless the stone can be located within three-fourths of an inch of the ureteral orifice, transcystic removal would not be advisable.

A combination of cystoscopic and ureteral examination with skiagraphs furnishes the necessary diagnostic data. The one method supplements the other, sometimes the X-ray will show stones which cannot be found by ureteral examination, and again, stones will be discovered with the aid of the ureteral catheter which are not shown in the X-ray.

We are indebted to W. F. Braasch and J. H. Selby respectively for their cystoscopic and radiographic data which enabled us to make the diagnosis in these cases.

This method of removing impacted stones in the terminal ureter is not new, and has been used by Rushton Parker, Crawford, and various other surgeons, but does not seem to have attracted general attention.

CONGENITAL UMBILICAL HERNIA, OR HERNIA INTO THE CORD

With a New Operative Procedure

By FRANK A. PALMER, M. D., Morris, Illinois

HERNIA into the cord of the newborn is a condition of comparatively rare occurrence. Lindfors found but one in 5,184 births. Thudicum found one in 2,000 births (ref. Ritterhaus, Deutsche Zeitschrift fuer Chirurgie, bd. lxxxix, s. 257), Adler found one in 5,887 births (ref. ibid.). Alex. H. Ferguson mentions but one in his monograph on hernia, which is largely a review of his wide and varied experience with hernias. Hilgenreiner, in a report of "the rare and remarkable hernias" which occurred in a series of 2,238 hernias in the clinic of Woelfler in Prag, mentions no case of this nature.

About one hundred cases have been reported, excluding the cases of antiquity.

The literature of the subject is in an unsatisfactory state, no one having made a satisfactory analysis of the cases reported, nor a satisfactory classification of the conditions which may be present. The literature of interest begins with the paper of Lindfors in Nord. Med. Archivs, bd. 15, p. 4 (ref. Ritterhaus, see above), in 1881. He was the first to apply the principles of antiseptic surgery to the repair of these hernias. In 1900, Hansson (cited by Sultan, 1902, Saunders' Atlases) was able to collect 73 cases of which 62 had been treated by surgical measures of one sort or another, and 50 of them according to the recommendation of Lindfors. Of these 50 cases 17 died, a mortality of 34 per cent.

Yates and Davis in American Medicine, 1907, p. 21, quote Hallet's analysis of 87 cases in the literature, of which 71 were treated surgically with a mortality of 32 per cent. The mortality of the 16 cases of his series treated expectantly was 50 per cent.

The high mortality where the displacement of the abdominal contents is great is notable. In two of the cases of Hallet's series the heart was in the sac. Both of these cases died. In the case of Yates and Davis, one had the greater part of the liver in the sac. It died. In one of the cases of Ritterhaus the bladder was concerned in the hernia. It also died. In these cases not only are the operations necessarily complicated and prolonged, and the normality of the organs concerned in question, but there is a distinct disproportion between the mass of the abdominal organs and the size of the abdominal cavity after the closure of the hernial ring which embarrasses the conduct of the vital processes (heart, liver, respiration, etc.) which further mitigates against the patient's recovery. For this reason it may be advantageous for the purposes of study to divide these cases into the simple and complex, including under the first head all those cases which contain only intestine and not over one-quarter of the liver, i. e., so much as may be conceived to have been drawn into the sac by simple traction by the intestine, and under the second head, those cases in which other organs are involved in addition. That it is necessary to include among the simple hernia those cases in which the sac contained a small amount of liver is evinced by the fact that in the 24 cases of Hallet's series in which the sac contained the liver in whole or in part, the mortality was only 33 per cent, or 1 per cent greater than the mortality of the whole series. Yet the mortality where large amounts of liver were involved was extremely high.

One is struck in reviewing the cases of the literature by the almost constant reference to the existence of attachments between the intestines and the inner aspect of the sac, or the peritoneum immediately within the hernial ring. These attachments are formed either by a persistence of the vitelline duct or by accidental adhesions between the intestine and the surrounding structures. These adhesions doubtless stand in a causative relation to these hernias, in that they prevent the first coils of the primitive gut

which are formed outside of the abdominal cavity from retracting into the abdomen, and thus prevent the abdominal walls from closing.

Lindfors, who led the way in the surgical treatment of these cases, advised the closure of the umbilical ring by suture of the abdominal wall in layers, and his lead has been generally followed by subsequent operators.

I take occasion to report the following case because I approached it from a somewhat different standpoint, and achieved a success which would seem to indicate that the new principle introduced was a proper one. There is almost no other condition for which an operation of such grave proportions is undertaken upon infants but a few hours after birth. It it well known that small infants stand operations of gravity but poorly, and there is in all the reported cases of this deformity a striking correspondence between the severity of the operative procedure and the welfare of the infant. All of which points to the extreme desirability of devising for this condition some simple and rapid procedure which will enable us to remove the immediate dangers of hernia into the cord without exposing the tiny child to a prolonged operation. Reflecting upon this and upon the tendency of all hernial openings in the newborn toward closure, especially marked in the umbilical ring, and believing the attachments which held the intestine between the abdominal plates to be the causative factor, the removal of which would permit the umbilical ring to close, I was led to this case in proceed in the simple manner below detailed.

A female infant, aged 5 hours, the product of a difficult twin labor conducted by Dr. A. E. Palmer, of Morris, Ill., in which a high forceps was performed upon the first twin, and a version upon this child, which presented a hernia into the umbilical cord, about 8 inches in length and 16 in circumference. The covering consisted of the transparent membrane of the cord through which the numerous loops of intestine could be plainly seen. The cuff of skin about the base of the cord was about one inch in width.

At the labor the cord was tied beyond the hernia and the hernia wrapped in sterile gauze, and assistance summoned. The operation was performed in the country home 5 hours later, with the aid of an assistant and two nurses. The chloroform was given by Dr. A. E. Palmer with exceptional skill, and lasted about 45 minutes. The contents of the hernia were slowly reduced by taxis within wet sponges, with the exception of one loop of small intestine which would not re-enter the peritoneal cavity for reasons which could not then be determined. The sac was now resected a little beyond the edge of the cuff of skin. An examination of the loop of the unreduced bowel disclosed that it was adherent to the peritoneum just within and above the umbilical ring, for a distance of one-half inch, transverse in direction. A tentative attempt was made to loosen the adhesion, but as it was very dense, bled easily, and caused no obstruction of the bowel when completely reduced into the abdomen, it was left. The inner aspect of the portion of the sac which was formed of Wharton's jelly was smooth and shining and seemed to be continuous with the inner aspect of the peritoneum. The cuff about the base of the hernia, which was composed of skin externally, and this smooth peritoneum like structure internally, was now split into two layers. A continuous catgut was now laid to unite the two porportions of the internal layer in the median line, a Cushing suture being used to unite smooth surface to smooth surface. This suture lay in the axis of the body. The raw edges of the skin cuff were now united by a transverse continuous catgut suture. The child made an uninterrupted recovery. At no time was there protrusion through the abdominal ring, and now at three months after the operation the ring is firmly closed and the umbilicus has a normal puckered appearance without other scar.

In this case we contented ourselves with uniting the skin and peritoneum across the hernia opening in such a manner as to prevent the immediate recurrence of the hernia, depending for its ultimate cure upon the tendency of the umbilical ring toward closure during the early weeks of life. The absence of abnormal scar formation and presence of a normal puckered umbilicus is a matter of gratification, but of minor importance. The idea of leaving the cure of a hernia to the well known tendency of these openings toward closure during the child's early years, is not a new one. It is new only in its application to the umbilical ring. H. Maass, in the Berliner Klinische Wochenschrift, vol. xlv, s. 212, calls attention to the fact that in operating upon hernias in small children it is not necessary to suture the ring, but that suture or ligation of the sac is sufficient. He applied this principle to the cure of inguinal and femoral hernias, but singularly enough, in umbilical hernias he abandoned it and repaired these in layers.

While we realize that ultimate conclusions

may not be drawn from one case nor from an observation of three months' duration, we believe that the procedure described deserves adoption in all simple hernias into the cord, and in the complex cases where the technique is possible, because, 1st, the mortality has been so great in these cases in the past as to show the necessity for a simpler operative procedure. 2d, if a permanent cure of the hernia be not obtained by this means, nevertheless the immediate dangers of hernia into the cord are removed (i. e., dessication of the sac, and peritonitis), and the more radical procedure may be performed, if necessary, later when the child has attained a more advanced age and a greater resistance. 3d, this case demonstrates that a permanent cure may be obtained by this means alone.

TESTING THE VIABILITY OF STRANGULATED INTESTINE[1]

By S. C. PLUMMER, M D., Chicago, Illinois

THE question as to whether a loop of strangulated intestine is in fit condition to be safely returned to the abdominal cavity is one which frequently puts the judgment of the operating surgeon to a severe test. The most important criterion as to this fitness for reduction is the condition of the circulation of the blood in the strangulated loop, as indicated chiefly by the color of the loop.

It not infrequently happens that an intestine so deeply colored as to appear past reviving will, after the removal of all constriction, recover its circulation and be obviously safe to reduce.

In operating on a strangulated hernia, it is of the utmost importance to replace the intestine and complete the operation for radical cure at once, if this can safely be done. Not to do so means, at the very least, that the strangulated loop must be left out of the abdomen for several hours, or even days, until it can positively be determined whether it is to be replaced or treated in some other manner. This in any case means a second operation, at which, if the circulation has been restored, the intestine is replaced and the radical operation completed. In case the circulation is not restored, either an artificial anus must be formed or the intestine resected.

Whether the intestine is to be replaced at once or, on the other hand, the patient subjected to a second operation to replace it, or subjected to an immediate or secondary resection of the bowel or formation of an artificial anus is of great moment as viewed from the standpoint of the patient's welfare. Multiple operations and time-consuming procedures are to be avoided, if possible.

Anything that will assist in determining quickly the viability of the intestine, is then, of decided value.

The almost universal method of encouraging the return of the circulation in the strangulated loop is the use of warm normal salt solution, either by irrigation or by the application of compresses. The usual length of time advocated for this test is from ten to fifteen minutes.

A recent case in which I operated for strangulated hernia suggested to me a procedure which is so simple that I can scarcely understand why it has not been used more frequently, yet I had never heard of it and have been unable to find any mention of it in the text-books.

The patient, a woman, aged 63 years, quite obese, had had symptoms of intestinal obstruction for four days. On the left side was an inguinal hernia of moderate size. After relieving the constriction the contents of the sac were found to be a loop of small intestine, about three inches long, and its mesentery. There was also a small amount of fluid tinged with blood. The intestine was

[1] Read before the Chicago Surgical Society, March 3, 1911.

of a deep purple color, approaching black, and was thickened and edematous. The mesentery presented an area equal in length to the constricted bowel and more than an inch in width at its widest part, which was swollen and of the same color as the intestine.

It required more than the usual amount of traction to pull out the loop so as to expose the normal intestine beyond. Both the afferent and efferent portions of the loop showed deep furrows marking the site of the constriction.

Here was an intestine whose viability was questionable. It was highly desirable that it be replaced, if this could safely be done. I accordingly applied hot compresses, wet with normal salt solution, for fifteen minutes. Not only was there no improvement in the circulation of the parts which had been strangulated, but the adjacent normal intestine was becoming edematous and of a darker red color than before. I realized now that it was the traction which I was making which interfered with the circulation, and, to relieve this traction, I temporarily reduced the affected parts, at the same time delivering some of the adjacent intestine, so that I could again withdraw the affected parts for inspection. After allowing the previously strangulated parts to remain in the abdominal cavity three minutes, I withdrew them. The change was striking. All swelling had left the intestine, the color was normal, the furrows at the two constricted points could scarcely be seen. All that was left of the evidences of circulatory disturbance was an area of venous stasis, one inch long and one quarter of an inch wide, on one side of the mesentery, close to the bowel.

The hernial contents were at once reduced for the second time, this time permanently, and the operation completed, the patient making an uneventful recovery.

Without this temporary reduction, I certainly would not have dared to replace this intestinal loop, and would, perforce, have resorted to one of the less desirable alternatives mentioned above, in which event the outcome as to the life of the patient would have been made much less certain.

I recommend the further trial of this procedure of temporary reduction. In the matter of time-saving alone it is advantageous, but in the doubtful cases, where other methods fail, it may decide the vital question as to whether to replace the bowel or not.

What more efficient hot application can one conceive than that which the intestine receives when replaced in the abdominal cavity and surrounded by the abdominal contents, and where can the circulation of a part be favored more than when that part is in its normal location?

It must be admitted that there are cases where this temporary reduction is contraindicated. In some cases the progress toward gangrene is so far advanced that reduction would be fraught with danger of rupture of the intestine and consequent infection of the peritoneal cavity. In other cases where the fluid contents of the sac or the surface of the strangulated parts show signs of infection, the propriety of the procedure might be questionable; but there are many cases where I can think of no possible objection to the procedure.

Incidentally, I would call attention to traction as an element in the causation of strangulation. Macready[1] says: "After the stricture has been divided in the operation, the bowel can be almost invariably drawn further down without resistance." In the case I have reported this was not so. The bowel could be drawn further down, but not without resistance, and the adjacent normal bowel showed circulatory disturbance after a few minutes, as a result ot the traction required to draw the bowel down. The prompt disappearance of this disturbance, when the bowel was relieved of this traction, by temporary reduction into the abdominal cavity, justifies the assumption that traction is, occasionally at least, a secondary cause of the phenomena of strangulation.

[1] Macready: Treatise on Ruptures, 1893, page 310.

COMMON FALLACIES REGARDING SKIN DISINFECTION WITH SPECIAL REFERENCE TO THE IODINE METHODS

By MARTIN B. TINKER, M. D., and HOWARD L. PRINCE, M. D., Ithaca, New York

PERHAPS the most common fallacy with regard to skin disinfection is the belief that clinical results alone are a test of the value of any method of skin disinfection. In the first place, the skin of people accustomed to habits of reasonable personal cleanliness is not apt to be badly infected. This was abundantly shown by results in the recent Russo-Japanese war. The Japanese limited the number of wound infections to an astonishingly low minimum by requiring their soldiers to take a full bath and put on clean clothing before going into battle. In the second place, even with wounds contaminated by dirty objects, the resulting infection is usually mild for the *bacteria* with which we come in contact *under ordinary conditions are of low grade virulence.* This is explained by the fact that conditions favorable for life and growth of bacteria (heat, moisture, and culture medium) are not present under usual conditions. The bacteria on the floor, pavement, and ordinary objects around us are too cold; they ordinarily lack moisture and are not surrounded by suitable culture medium. They are in the position of a man put in a dark dungeon and fed on bread and water. Under such conditions the strongest man would in a short time be unable to make much of a fight. So the bacilli living under unfavorable conditions soon lose virulence and many die. In most cases they are not capable of doing us serious harm. This explains why many men are able to get fairly satisfactory results in surgery with relatively faulty aseptic and antiseptic technique.

Another very common error is the acceptance of the statement of manufacturing chemists as to the antiseptic value of their products. Repeated careful tests of reliable observers have shown that such statements are in many cases absolutely unreliable.

A mistake sometimes made even by the more honorable manufacturing chemists, in their tests of antiseptic value of drugs, as well as by certain laboratory workers, is that *antiseptics are not tested under the conditions in which they are used in the operating room.* As an example of this kind of fallacy, bichlorid of mercury is tested in the laboratory by a variety of methods which do not take into account the fact that it is very readily precipitated by organic matter. Unless means are taken to prevent, the organic matter in certain tap water will precipitate enough bichlorid of mercury to make the strength of a solution uncertain. In the presence of much blood serum the bichlorid is directly precipitated. This explains many cases of wound infection where this antiseptic has been used under unsuitable conditions. If properly used it is unquestionably among our most reliable antiseptics.

A fourth important fallacy is that the common slightly resistent bacteria ordinarily giving wound infection are used in the laboratory in testing the value of any antiseptic. The vegetative forms, such as staphylococcus aureas and albus, colon bacillus, or bacillus pyocyaneus, are killed by many weak antiseptics. This fact makes it possible for a surgeon to get clean wounds in ninety-nine cases out of a hundred. The resistant spore forming bacteria are of relatively infrequent occurrence, but it should be evident to every thinking man that *our methods must be reliable enough so that resistant spore forming bacteria,* such as tetanus bacillus and anthrax bacillus, *will be certainly destroyed.* Otherwise in the one case in a hundred or perhaps one in one thousand in which these bacteria are present a fatal result is likely to occur.

Probably the most common fault in skin disinfection methods as practiced in our clinics is that insufficient time is given to the preparation. For seven years one of us (M. B. T.) has tested all the generally used antiseptics and methods of skin disinfection with classes in surgery in the bacteriological

laboratory of Cornell University Medical College. No reliable method which is at the same time easy and rapid has been found. Trustworthy skin disinfection requires conscientious, painstaking effort, and time! time! time! The average surgeon is a busy man and is apt to scrub his own hands carefully but allow his patient to be cleaned up without much personal attention as to time and care devoted to such preparation. If a man has a watch before him, ten minutes is a long time to devote to the preliminary scrub when one is in a hurry. There is no antiseptic thus far suggested for use on the human skin that can be used in sufficient strength to *certainly* kill spore forming bacteria distributed about and under the nails of both hands, in less than five minutes. This might be possible if the bacteria were on the surface but in order to get positive results, the antiseptic must penetrate the superficial layers of the skin and must be worked into the crevices in and around the nails. Very few antiseptics are trustworthy even when used for five minutes. If we are to scrub our hands thoroughly enough to get rid of street contamination with certainty before using the antiseptic, at least five minutes must be taken.

A further error less commonly seen than formerly, is the fairly thorough *disinfection of the hands* or skin of the patient *followed by handling contaminated objects* and then quieting one's conscience by a few splashes in some antiseptic solution. It is unfortunate that many surgeons who are looked up to as leaders in the profession are sometimes careless in these matters. The less experienced man unconsciously makes breaks enough in his technique without the further excuse that Professor So and So in his clinic doesn't seem to consider it necessary to be so fussy with regard to details and his results are good enough.

That this question of hand disinfection is not settled to stay settled is evidenced by the introduction of new methods every year. The iodine methods are among the most recent claimants for favor. A series of excellent clinical results in the hands of a number of surgeons have convinced many that here is the rapid and easy method of certain disinfection which they have been looking for so long. That the iodine methods are easy and rapid cannot be questioned. That they are entirely reliable, we do not believe has been conclusively proved. Three years ago when favorable reports had begun to come from European surgeons one of us (M. B. T.) tested out this method in the laboratory, with a series of contaminations in almost every test that was made. A year ago the results according to various other modifications of iodine methods also failed to give reliable disinfection. Recent tests just made in the laboratory of Cornell Medical College as this paper is written, again show that the iodine method as used in the practice of a number of surgeons for whom we have the highest regard, are not dependable to kill spore forming bacteria. The tests were made with the idea of furnishing the most difficult conditions for the antiseptic. All who have advised the use of iodine have particularly warned against the use of water on the skin for several hours before the application of the iodine. The fact that no previous preparation of the skin was necessary has also been much dwelt on. The tests were as follows:

Into the skin of the fingers a bouillon culture of B. subtilis was well rubbed. After six hours allowed for drying, tincture of iodine was applied. When the iodine was dried into the skin, sterile threads were drawn across the skin vigorously and dropped in bouillon cultures. Thirty minutes after the first application of iodine, a second heavy application was made and was allowed to dry. Sterile threads were applied as in the manner above mentioned and scrapings made with a sterile scalpel were dropped on the bouillon culture medium. These scrapings must have been heavily impregnated with iodine. In every case growth in culture was prompt and positive.

In the next series of tests, the skin of the upper arm and also of the fingers was impregnated with bouillon culture of B. subtilis. The areas were protected by sterile dressing and kept free from water for 24 hours, then were covered with tincture of iodine over

which sterile dressings were placed. After one hour and a half, a second coating of tincture of iodine was applied and covered with sterile dressing. After three hours, scrapings were made with a sterile scalpel and dropped in the bouillon. Every culture showed prompt and positive growth. Two previous series of experiments were made with medical students under careful supervision. Our experience is that students testing out such methods are likely to be enthusiastic and thorough and that the care and time taken will fully equal that given to the scrubbing and disinfection by the average trained surgeon. The last series of experiments were made by a thoroughly trained laboratory man working with a practical surgeon (H. L. P.). We hoped to get better results, for like all the rest we are looking for a rapid and easy method. No claim is made that these experiments are conclusive. They have simply convinced us personally that we must look still further for a short cut in this important matter of skin disinfection. It is possible that iodine has additional value besides its antiseptic value in that it is an active counterirritant and that the increased flow of blood to the region of operation with also increase in number of leucocytes present would favor wound healing.

In our best clinics where wound infection has occurred, the laboratory man has almost always been called in to discover the source of trouble. For the reasons given above in this paper, we believe that the laboratory test is the ultimate test of skin disinfection. A good deal of experience has shown that there is a decided difference in the value of various antiseptics in inhibiting or killing different varieties of bacteria. For example, metallic silver when dropped on a plate culture of anthrax bacillus shows a wide area free from growth. On the other hand silver has a relatively slight influence in inhibiting bacillus pyocyaneus. What is needed is a method combining the use of several antiseptics which will kill all forms of bacteria. If a method will rapidly destroy the more resident spore forming bacteria there will be no particular trouble with the less resistant vegetative germs.

Exacting laboratory tests carried out for seven years have convinced us that several combinations are reliable. Among these are fresh chlorinated lime and soda followed by bichlorid solution: prolonged scrub followed by bichlorid solution and alcohol; and scrubbing followed by Harrington's solution. Of these the use of Harrington's solution seems simplest for preparation of the patient's skin.

Feeling the desirability of again testing Harrington's solution, skin was impregnated with B. subtilis in the same way as with the first series where iodine was used. A solution containing a one to 250 bichlorid mercury with 2 per cent of hydrochloric acid in 95 per cent alcohol was used. Sterile thread was used as above described and also scrapings. In every case after a three minute application, the resulting cultures were negative. After a two minute application during which friction was applied with the moistened gauze, cultures proved negative. In more than half of the tests after a one minute application, cultures were negative. In hand disinfection to make certain that Harrington's solution remains in contact with all possibly contaminated areas around the ten nails for the two minutes which we have found needed for certain disinfection, at least five minutes must be devoted.

From the foregoing experiments, we conclude that iodine does not fulfill the requirements for safe preparation of the skin, that it will not destroy the spore forming bacteria occasionally present. We would call attention to the fact that one English surgeon,[1] still an advocate, reports one death from tetanus, occurring in only three hundred clean cases prepared with iodine. The fact that moisture in the skin interferes with the action of iodine, contraindicates its use in many accident cases, where owing to the nature of the wound it has been recommended as most advantageous.

Basing our action on the foregoing experiments, we are now using Harrington's solution in the preparation of the patient's skin, applying it with friction for about two and a half minutes and sponging off with alcohol. In this way, we avoid sloppy, wet

[1] Stretton, J. Lionel, British Medical Journal, 1910, vol. i, page 1350.

surroundings of patients during operation. So far results have been entirely satisfactory.

Experience shows that the skin of some hands suffer from frequent long continued applications of Harrington's solution, therefore in the preparation of our hands, we continue to rely on the old time-consuming scrub, immersion in bichlorid of mercury solution, and a final cleansing in alcohol. From laboratory tests carried out during the past seven years, we know this to be efficient for any and all forms of bacterial life.

CONGENITAL STENOSIS OF THE URETER[1]

By DANIEL N. EISENDRATH, A. B., M. D., Chicago, Illinois
Professor of Surgery, College of Physicians and Surgeons; Attending Surgeon, Michael Reese and Cook County Hospitals

MY attention was directed to this most interesting chapter of renal and ureteral surgery by the following case.

On May 14, 1910, I was asked to see Wm. D., a boy of fourteen, by Drs. M. L. Goodkind and Frank Wright, of our medical department. The patient had been seen by them in the evening of May 13th and sent to the hospital with the tentative diagnosis of some left-sided acute lesion of the left side of the abdomen. The boy was well developed for his age, with a negative family and personal history. He had never been ill until the onset of the present trouble. The latter began suddenly three days before being seen by Drs. Goodkind and Wright. The boy, who had apparently enjoyed good health and had attended school as usual the entire day, was awakened from sleep by a sharp colicky pain in the left side of the abdomen. This was so severe that it was necessary to call a neighboring physician during the night, who administered opiates. The pain was most marked in the left iliocostal space and radiated toward the front. It was accompanied by nausea, but no vomiting. This pain recurred at intervals for nearly seventy-two hours, until seen by Drs. Goodkind and Wright, who sent him to the service of the writer in the Michael Reese Hospital. Upon admission examination showed that he seemed unusually well developed for his age (fourteen). Heart and lungs were negative. The left half of the abdomen was distinctly rigid and tender from the median line in front almost to the spine behind. The most marked sensitiveness seemed to be located in the left iliocostal space, that is, over the left kidney. It was impossible to feel the sausage-shaped tumor, to be referred to later, owing to the left-sided muscular rigidity. Rectal examination was negative. There was retention of urine for the preceding twelve hours. The catheterized specimen showed nothing of importance except a small number of pus corpuscles.

The temperature varied from 100° to 101° (rectal). We were unable to make a satisfactory diagnosis before operation for several reasons; first, the acute onset of left-sided abdominal symptoms; and second, the absence of any history which would point to a preceding renal or ureteral infection. We thought of the possibility of two conditions: (a) appendicitis in an appendix lying to the left of the median line, and (b) inflammation of a diverticulum of the sigmoid (diverticulitis). Owing to the gradual increase in the severity of the symptoms for the preceding four days, an exploratory operation was deemed advisable.

On May 14, 1910, the patient was anæsthetized and the abdomen again palpated. Owing to the disappearance of the muscular rigidity we could now palpate a peculiar sausage-shaped, rather soft mass, just to the outer side of the left rectus muscle. The tumor became gradually narrower as it disappeared into the pelvis (Fig. 1). An incision was made through the upper portion of the left rectus muscle. Upon opening the peritoneal cavity the sausage-shaped tumor previously felt through the abdominal wall was seen to be of a pale bluish color and of soft consistency, lying along the inner side of the descending colon, but behind the peritoneum. One could readily recognize this fluctuating tumor as the greatly distended ureter, by the fact that it ended above in the kidney and crossed the left iliac vessels at the pelvic brim, suddenly becoming narrower as it passed into the pelvis.

The left rectus incision was closed and the patient turned upon his side. Through the usual incision employed for exposing the upper portion of the ureter, one could readily see the greatly dilated ureter. The descending colon and sigmoid flexure having been retracted inward, the ureter was visible throughout its abdominal portion. The retroperitoneal cellular tissue was very edematous resembling very much the serous exudate seen in the abdominal wall in the vicinity of an appendical abscess. This confirmed our suspicion of some recent infective condition complicating a previously existing hydro- or, more properly speaking, uro-ureter.

The ureter was dilated to the size of the small

[1] Read at the April, 1911, meeting of the Chicago Surgical Society.

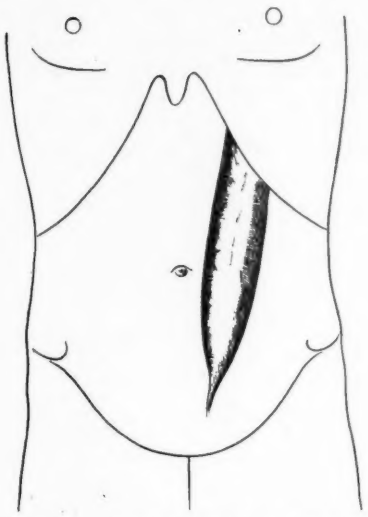


Fig. 1. Sausage-shaped tumor felt on outer side of left rectus (under anæsthesia) in writer's case. It tapered toward pelvis.

intestine (Fig. 2), and its outer fibrous sheath was so thin that it was impossible to avoid tearing it while exposing the structure. One could distinctly feel that this dilatation ceased rather suddenly shortly after entering the pelvis at a point one and a half inches above the bladder. From the point of sudden cessation of the enormous dilatation to the bladder, the ureter felt firm and cordlike. The ureter was incised between forceps and a slightly turbid, straw colored fluid escaped. Unfortunately, no cultures were made. The mucous membrane showed marked swelling, was greatly congested, and extremely friable. Upon enlarging the incision in an upward direction, two horizontal valvelike poles of mucous membrane were visible about two inches below the kidney. Palpation along the inside of the ureter showed a distinct narrowing (Fig. 2) at the junction of the dilated ureter and the pelvis of the kidney. In a downward direction one could follow the dilatation into the true pelvis, where it ended suddenly, as just described. It was possible to pass a ureteral catheter into the bladder through the thickened ureter lying below the dilated portion, so that we concluded that the stenosis could not be a complete one.

A plastic operation on the ureter or a transplantation of the proximal end into the bladder were considered out of the question for three reasons: First, the evident presence of infection; second, the disproportion in size between the distal narrow segment and the enormously dilated proximal portion, and, finally, the great fragility of the walls of the proximal portion. I therefore inserted a rubber tube into the proximal portion, hoping at a subsequent operation either to bring it into the bladder or to insert some intermediate tissue with a lumen, like the non-impregnated Fallopian tube of a dog, into the gap between the ureter and bladder. His temperature, however, continued to rise after the operation, so that it was necessary to perform a ureterectomy and nephrectomy secondarily. The kidney showed multiple foci of suppuration in its cortical portions, that is, a septic pyelonephritis of recent origin, and the pelvis was greatly dilated, there being a moderate degree of hydronephrosis. The mucous membrane of the renal pelvis was very red and swollen, showing the typical changes incident to an acute pyelitis. The boy made an uneventful recovery from this second operation, and has enjoyed the best of health up to the present time (April, 1911).

Summary. A boy of fourteen, with no venereal infection or other previous illness, has sudden onset of all left-sided abdominal inflammatory signs. Sausage-shaped soft mass felt through abdominal wall shown to be ureter dilated to size of small gut. Dilatation ends abruptly about one and one-half

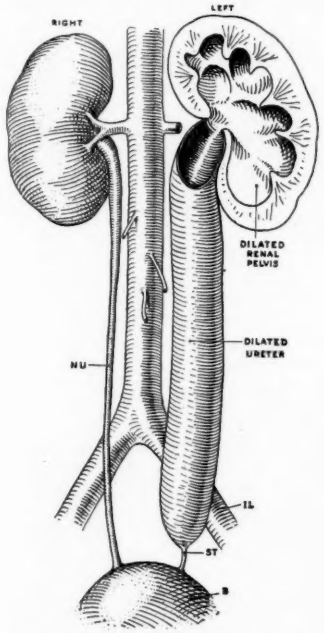


Fig. 2. Author's case of congenital stenosis of left ureter (see text). NU, Normal right ureter. IL, Iliac artery. Constriction (ST) was just distal to place where ureter passes across vessel. B, Bladder. (Semidiagrammatic.)

inches above bladder. Ureter distal to this point feels hard and cordlike, but admits ureteral catheter. Evidences of infection around dilated portion. Removal of latter, and of a kidney showing marked evidences of infection and a moderate degree of hydronephrosis. After a careful study of the operative findings and consideration of the age and absence of any other source of ureteral obstruction, we concluded that the stenosis of the lower ureter with subsequent dilatation of that portion above it, must have been present for many years, and could be best explained as of congenital origin.

While discussing the above case with my colleague, Dr. I. A. Abt, of the pediatric department of the hospital, mention was made of a similar condition he found at autopsy, which I am permitted to add to the report of my case, through the courtesy of Dr. Abt. The photograph of the specimen of this second case is shown in Fig. 3.

An infant, ten days old, had had marked icterus neonatorum, and died without showing any symptoms referable to the urinary tract. At autopsy Dr. Abt found a urachus which was patent throughout its entire length from umbilicus to bladder. The right kidney and ureter were normal in every respect. On the left side the ureter showed two constrictions. The upper one (Fig. 3) was of such a high degree that it was impossible to insert a filiform bougie through it. The ureter proximal to it and the renal pelvis showed a moderate degree of dilatation, but there was quite a fair amount of renal parenchyma present. The lower constriction was not examined as to its patency, but the ureter proximal to it was far more dilated than was true of the upper constriction (Fig. 3). The kidney showed a moderate degree of hydronephrosis.

This specimen illustrates in an excellent manner the two most frequent locations of congenital stenoses of the ureter, i. e., just below the ureteropelvic junction and again just above the vesical end of the ureter. There was no lumen present at the upper of the two constrictions, and probably a great reduction in the lumen at the lower point of stenosis. The absence of any marked hydronephrosis shows that the escape of urine had only been interrupted to any extent during the last days of intra- and extrauterine life. The lower constriction with its accompanying dilatation of the ureter in this case

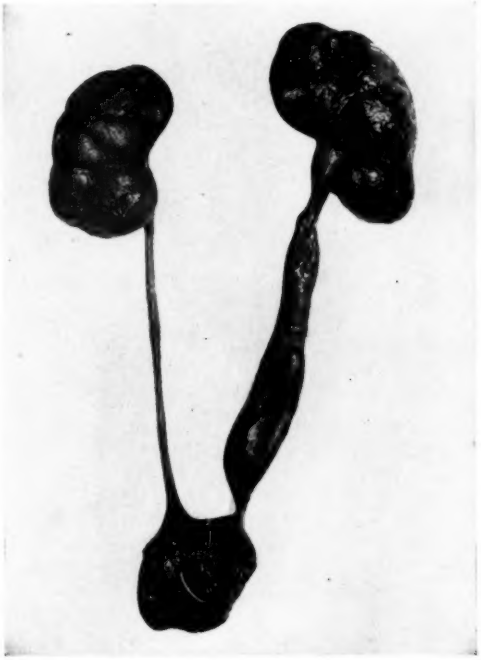


Fig. 3. Left ureter of ten day infant showing complete atresia close to kidney and a second incomplete closure just above bladder with secondary hydroureter (Dr. I. A. Abt's case).

corresponds in every particular to the condition found during the first operation in my own case. Dr. Abt's case also resembles in every particular, case No. xxvii, of Bottomley's series, in which there were present alternately a lumen and no lumen, and also resembles Nichols' case of stricture both of the upper and lower ends of the same ureter.

Dr. John T. Bottomley's recent article[1] upon "Congenital Strictures of the Ureter" takes up the subject in such an exhaustive manner that but little remains to be said. With the exception of a more detailed discussion of the etiology and references to illustrations of the more typical cases, Dr. Bottomley's paper will be freely quoted in the following pages. My paper, like that of Dr. Bottomley, will be limited to those cases in which the ureter either opens into the bladder or evidently intended to open into

[1] Annals of Surgery, November, 1910.

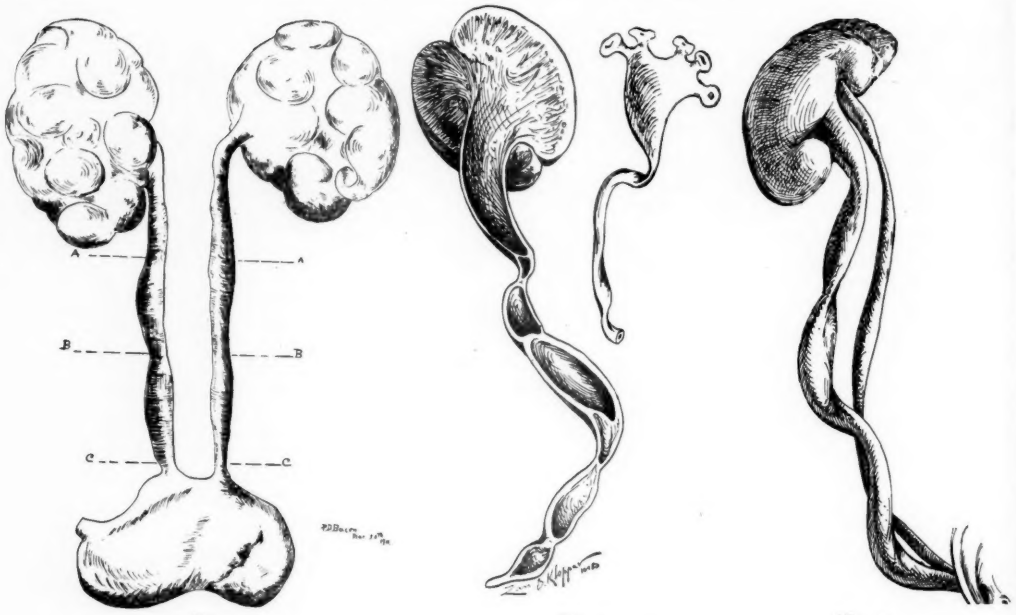


Fig. 4. Fœtal ureters (Seitz) showing normal constrictions (A, B, and C) and normal dilatations on their proximal side.

Fig. 5. Sagittal section of adult human ureter showing spiral twists, constrictions, and valve formation (Byron Robinson).

Fig. 6. External view of adult human ureter showing spiral twists, constrictions, and valve formations (Byron Robinson) in a case of double ureter.

it, and hence omit those cases in which the ureter opens into the intestinal or genitourinary tracts, or elsewhere. In his paper Dr. Bottomley reported six cases for the first time, including one of his own. I have found four cases in recent literature, and adding Dr. Abt's and the writer's two cases, the total number recorded up to the present time (April, 1911) is sixty-three.

Etiology. The exact cause is not clear. It has seemed to the writer that two theories in regard to the formation of these strictures seem quite plausible. The first of these is the application to the ureter of the observations of Dr. Dean D. Lewis upon the formation of congenital diaphragms of the larynx due to persistence of the concrescence of the epithelium of the fœtal anlage. The second theory is that of the writer's, that these stenoses occur as the result of coalescence of the valves often present in the normal human ureter or the non-development of a lumen at certain points in the ureter, especially where there are frequently observed normal constrictions or twists. This second theory as to the origin of these strictures is in a great measure dependent upon making the same observations at some future time on an embryo ureter that were made on the embryonic larynx. Dr. Lewis has kindly given the writer the results of his observations in the following lines: "The larynx and duodenum are closed during a part of their development by epithelial masses. This epithelium gradually disappears, so that a lumen is established. When this epithelial concrescence persists, malformations develop, which are usually incompatible with life. Congenital diaphragm formation in the larynx, thirteen cases of which were collected in 1893 by Braun, is due to the failure of the epithelial concrescence to disappear. A laryngeal diaphragm is supposed by some writers to be due to an intrauterine infection, but the extent

of the diaphragm and its physical characteristics are a strong argument for failure of disappearance of the epithelial concrescence. The same thing practically occurs in the duodenum and best accounts for the frequent strictures found here in the newborn. While an epithelial concrescence has not been demonstrated in the ureter, where are many factors, such as the narrow lumen and relatively rigid walls, with an abundant epithelium, which suggest that such an epithelial concrescence may occur. Many cases can be best explained in this manner."

In regard to the second theory, it is at best simply an application of the preceding view of Dr. Lewis to certain anatomical conditions normally present in the fœtal ureter, which would favor such an epithelial concrescence.

Seitz[1] made observations upon the ureters of fifty fœtuses in the Munich clinic, and confirmed the observations of Schwalbe,[2] made in 1896, in regard to the constant occurrence of a distinct narrowing of the human ureter at the point where the ureter crosses the pelvic brim (B in Fig. 4). Just above this there is a spindlelike dilatation of the ureter. There is a second narrow place close to the renal pelvis (Fig. 4), and a third just before the ureter enters the bladder wall. Up to the seventh month Seitz found the ureter of uniform caliber, but in two-thirds of his specimens (35) near term he found the chief narrowing and proximal dilatation as described by Schwalbe.

The observations made by Byron Robinson and others upon the adult human ureter have shown that there are three normal points of narrowing (Figs. 5 and 6) which correspond to the above observations upon the fœtal ureter. Another factor which favors stenoses is the presence of valves due to folds of mucous membranes (Figs. 5 and 6). Two of these were seen in the upper portion of the ureter in the writer's case, but did not cause any stenosis. These valves contain mucous membrane, submucous and muscular tissue, and probably arise from bends (Figs. 5 and 6) due to a too rapid growth of the ureter in proportion to that of the kidney.

[1] Seitz. Beiträge zur Geburtshilfe u. Gynäkologie, vol. xiii.
[2] Anatomischer Anzeiger, vol. xii.

Fig. 7. Case showing protrusion into bladder (Johnson's case). Right kidney enlarged and its pelvis distended. Right ureter dilated and curving. Double ureters on left side, both dilated and tortuous. Protrusion extends from left ureter into urethral canal (see text).

Cochwitz and Wölfler[3] found one to five more or less pronounced mucous membrane valves in twenty out of one hundred cadavers of children. They may obstruct the lumen so that only a fine probe can be passed.

Location of strictures. In several of the cases collected by Bottomley, a portion of the ureter was wholly fibrous, while in others the ureter was impermeable throughout and was

[3] Arch. f. Klin. Chir., vol. xxi

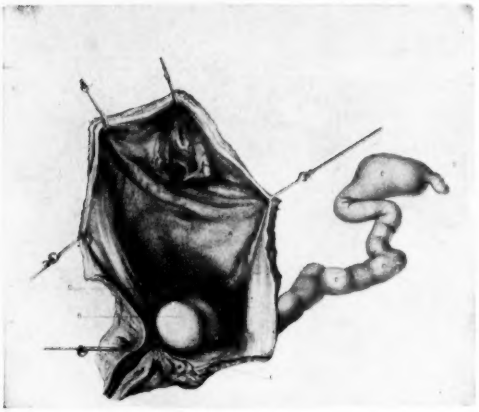


Fig. 8. Cystiform protrusion of closed end of left ureter into bladder. Dilated left ureter. Atrophied left kidney (Bostron's case).

represented only by a fibrous cord, a functionless ureter. Teyssèdre[1] collected reports of eleven such cases. This may lead to absence of the kidney or of the whole or a portion of the ureter. In eight cases of Bottomley's series the stricture was located in the upper third of the ureter, usually at or close to the opening into the renal pelvis. While writing the present paper, I have encountered a case of enormous congenital hydronephrosis, due to a stricture of the ureter at its junction with the renal pelvis. The case will be published later.

In 36 of 56 cases the obstruction was in or very close to the bladder, as in the writer's case. Nichols' and Abt's cases (Fig. 3) showed stricture both at the upper and at the lower end of the same ureter. The same ureter may present alternating portions with and without a lumen.

The form. This varies very much. It may be represented by a sharply defined narrowing, or may take the form of a section with a length varying from one-fourth inch to four inches, of the caliber of a fine probe, or ureteral catheter, as in my case. The stricture may be passable or impassable.

The most important, and, in their effects, the most far-reaching modifications of form are seen in the obstructions at the lower end of the ureter. In these the ureter usually reaches the bladder and in most instances ends there in a blind sac (Figs. 7 to 12). This blind end may be just beneath the mucous lining of the bladder,[2] may lie in the muscular layer of the bladder wall, or may just reach the outer wall. If the blind end is in the muscular layer and one examines the bladder from within, either there will be no trace whatever of an ureteral opening, or in its place will be seen a dimple, a shallow invagination of the mucous membrane. If the blind end is just at or in the outer layer of the bladder wall (and this is a rather unusual occurrence), there may appear just above it a localized dilatation of the ureter, which takes the form of a cyst just behind, i. e., outside, the bladder. It is conceivable that this external pocket, if large, may compress the bladder, crowding in the posterior wall, or may, in women, even bulge the vesicovaginal septum. In case xix, the cyst was as large as an egg. In some similar cases

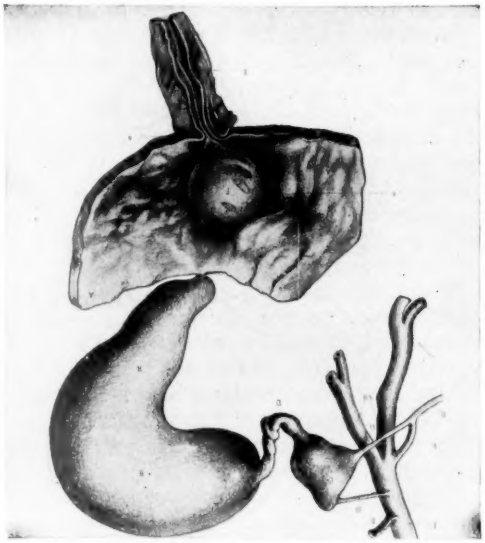


Fig. 9. Congenital closure of left ureter with protrusion of closed vesical end into bladder. Enormous dilatation of left ureter. Marked atrophy of left kidney (Bostron's case).

[1] These de Paris, 1892.

[2] Since writing this article I have operated on a case of this variety. There was a cystiform protrusion of the dilated vesical end of the ureter, which almost filled the entire bladder.

this localized cystlike formation does not take place, but the ureter becomes dilated throughout its length.

The most interesting forms, however, have to do with the ureters ending just beneath the vesical mucous membrane. These produce a cystlike protrusion of the mucous wall into the vesical cavity. The protrusions range in size from that of a small pea to one completely filling the bladder; the smaller are usually hemispherical in shape; the larger are either triangular or finger-shaped (Fig. 7), sometimes reach the vesical opening of the urethra, may pass varying distances along the course of the latter, and in women may even appear at the external meatus. When empty, they are flat and flaccid; when full, are finger-like, pear-shaped, and tense, broader and thicker at the base, and gradually tapering and thinning in the direction of the tip. Occasionally one ends in a bulbous enlargement. They exhibit lengths varying from 0.5 cm. up to 6.5 cm. The diameter at the base varies from 2 cm. to 5 cm. They are lined at one side by the ureteral and on the other by the vesical mucous membrane (Fig. 11). The ureteral opening into these pouches may be bristlelike or may be an aperture 2 cm. in diameter. Usually (in 12 out of 17 cases) the protrusions are blind cul-de-sacs without an opening into the vesical cavity. In five cases there was a communication between the protrusion and the vesical cavity, almost invariably by minute openings at the tip or on the side of the former. A supernumerary ureter gave rise to this form of ending in eight cases, a single ureter in nine cases. It is usually unilateral, but Burckhard reports an instance in which it was bilateral.

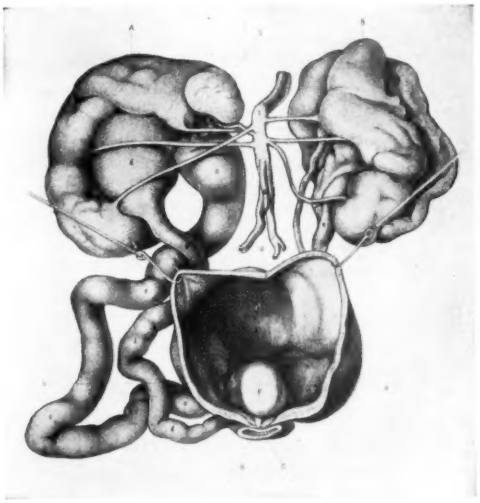


Fig. 10. Case showing protrusion into bladder. Reduplication of both ureters. Embryonic closure of one ureter with cystiform projection of vesical mucous membrane, which blocked the internal urethral opening and compressed the other ureteral openings. Double hydronephrosis (Bostron's case).

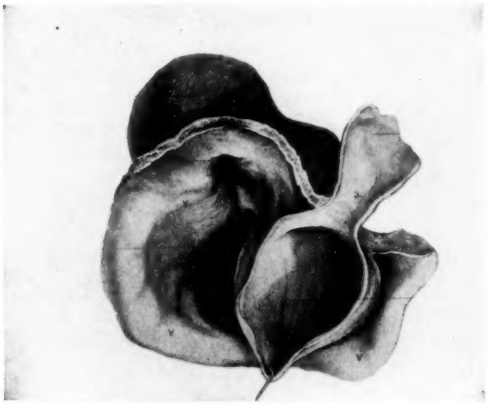


Fig. 11. Cystiform projection of right ureter into bladder. Ureter opens widely into protrusion (Bostron's case).

Effect on ureter. When the obstruction is at the lower end, the ureter is almost invariably dilated, thin-walled, and tortuous. It varies in size from that of a pencil to that of the small intestine (Fig. 2). It becomes widened and lengthened. Occasionally it is lobulated, shows windings and twistings, kinks and coils (Figs. 7 to 13).

Shield reports an unusual case in which an enormously dilated ureter filled the whole pelvis with its distended coils, which pressed on the rectum and on the other ureter. Veau has often seen the dilated abnormal ureter twine about the healthy ureter.

Effects on the pelvis and kidney. Either an enormous hydronephrosis or a most marked primary atrophy (Fig. 8) may result from

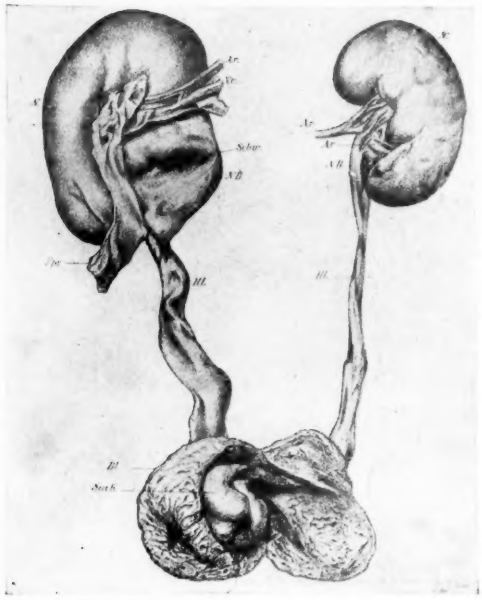


Fig. 12. Cystic dilatation of vesical end of the ureter (Englisch's case). Sach, Dilated end of ureter projecting into bladder. HL, Greatly dilated ureter terminating in dilated renal pelvis (NB).

ureteral obstructions of the same location and character. Hydronephrosis of varying degree is the rule. It may show itself simply as a slight or a moderate distension of the pelvis, or it may present as an enormous cyst filling the whole abdominal cavity, with only remnants of the true kidney tissue in the cyst wall. The writer's, recent case, not yet published, was of this variety. Infection produces its usual disastrous effects, and in some cases completely disorganized kidneys are found.

Several cases showed a marked degree of renal atrophy, the kidney in one case being of the size of a bean (Fig. 8).

Effects on the bladder. The cystiform protrusions of the blind ending ureter into the bladder may cause marked secondary pathologic changes in the bladder, in the other ureter, or in the other kidney. The protrusion from a supernumerary ureter may block the opening of the healthy ureter of the same side. The pocket may be so large as to block the ureteral opening of the other side.

Symptoms and diagnosis. In Bottomley's series, 19 cases gave either subjective or objective symptoms, which may be attributed with fairness directly or indirectly to the congenital trouble. Most of the cases were reported more from the pathologic than from the clinical point of view. Many cases occurred in subjects too young to make complaints.

The symptoms, in such cases as gave any, varied much, and it is impossible to draw from them any picture that would definitely determine in future cases a diagnosis of congenital stricture. Some trouble with urination, usually frequency, is the most common complaint. Pain in the loin, with a sausage-shaped tumor rising from the pelvis, was present in Bottomley's and the writer's cases. Cystiform protrusions into the bladder, when they are large, are apt to give very marked symptoms, both subjective and objective. Boström's two cases serve best to indicate what may probably be regarded as typical examples (Figs. 9 and 10).

The urine is usually negative.

Infection will bring its usual train of symptoms. However, in no case has a preoperative diagnosis been made, with the exception of the writer's second unpublished case. The present widespread use of cystoscopy will render much easier the recognition and significance of the cystiform protrusion into the bladder. Ureteral catheterization and the X-ray (collargol plate) will find wider and wider use as aids in determining the location of strictures.

To my mind, one of the most important points in those cases in which infection has not existed was the presence either of a sausage-shaped tumor on either the left or right side, extending from the kidney downwards, or a larger tumor which was elastic and semi-fluctuating in consistency, and lay in the retroperitoneal space, as demonstrated by the fact that the colon when inflated lay in front of it. When infection complicates, the clinical picture is quite similar to that of any of the other forms of infection of the kidney, the temperature becoming the most prominent symptom, and the diagnosis being one rather more of exclusion.

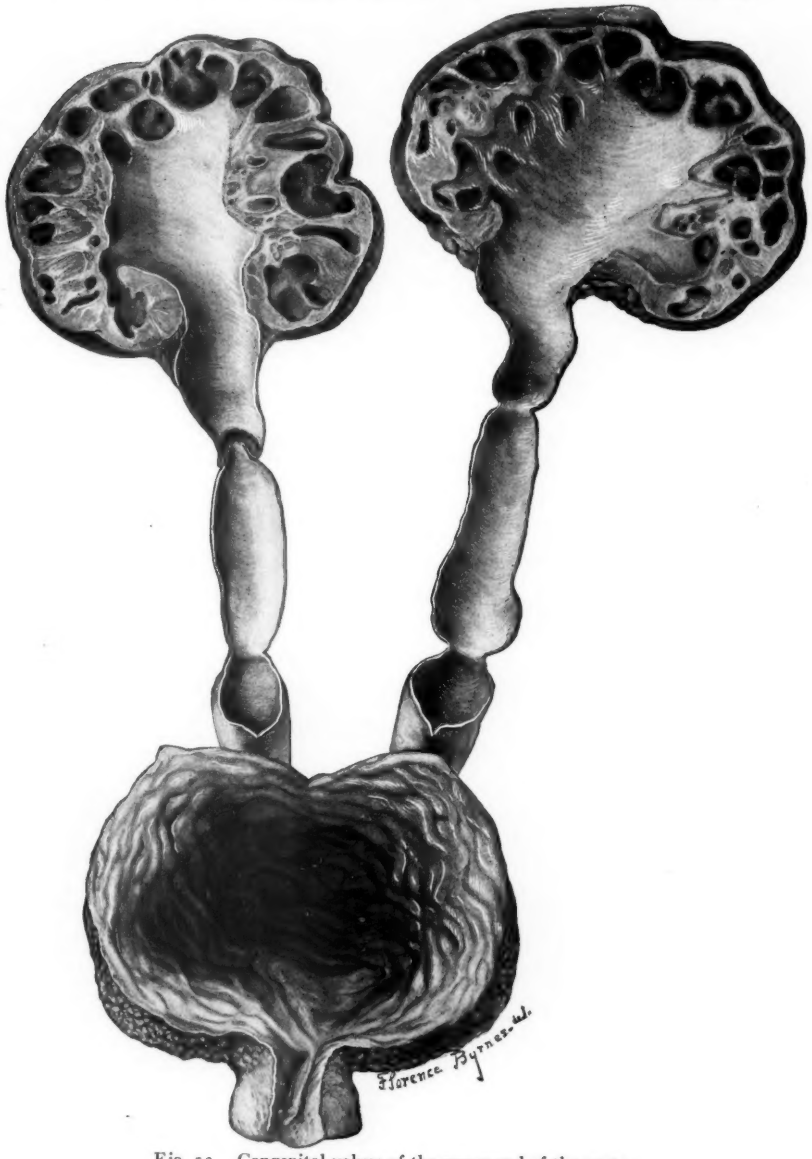


Fig. 13. Congenital valves of the upper end of the ureter.
(Kindly loaned by Drs. F. S. Watson and J. H. Cunningham.)

In those cases in which the stenosis is not sufficient to cause much obstruction, the diagnosis, of course, will become more a matter of accident. I was able to make a diagnosis in a second case of my own, which will be reported shortly, by the presence in a boy of twelve, of a large tumor in the left side of the abdomen, which laid behind the inflated colon. This abdominal enlargement had been noticed since birth. The tumor

itself was due to the dilated hydronephrotic kidney, the stenosis being at the junction of the ureter with the pelvis of the kidney. In this case the preoperative diagnosis of a congenital hydronephrosis due to congenital stricture of ureter was proven to be correct.

Treatment. The treatment depends (1) upon the degree of stenosis; (2) on the damage to the kidney due to the ureteral obstruction, and (3) on whether infection is present or not. In the latter class of cases nephrectomy is, as a rule, the only method of treatment. If the kidney has not been too greatly damaged, a pyeloureteroplasty may be possible, or an implantation of the ureter into the bladder. Bottomley states that cases have been operated on by Drew, Dudley Allen, Whipple, Mayo, Nichols, and himself. To this my own two cases can be added. Of Drew's cases one was cured and the other relieved by pyeloureteroplasty, the congenital stricture being near the renal pelvis in both cases. In cases operated on by Dudley Allen and Whipple, nephrostomy was performed in both cases, successfully in Whipple's case, but in Allen's case nephritis developed and the patient succumbed. Mayo's, Nichols', Bottomley's, and my own two cases are the only ones in which a successful removal of both cause and effect by nephrectomy was accomplished.

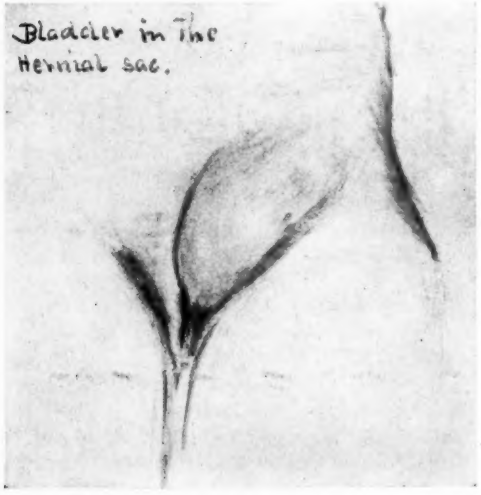
A CASE OF INGUINAL HERNIA OF THE URINARY BLADDER

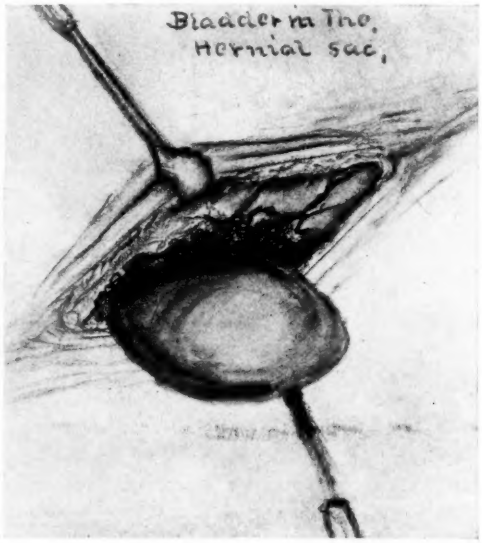
By HOMER I. OSTROM, M. D., New York City, New York

COMPARED with the escape from the abdominal cavity of other organs, that of the urinary bladder is of rare occurrence, but the following case presents other unusual features that it is believed are worthy of record.

L. D., housewife, American, aged forty-six years, widow, no children, menopaused three years, little systemic disturbance attending the change. General health good, habitually constipated requiring the constant and increasing use of laxatives, no signs of autointoxication. Spare build with little adipose tissue. Unusual muscular development for a woman. Negative history of serious illness.

Three years ago the patient was operated for right inguinal hernia. At that time there was a slight reducible swelling in the corresponding left





inguinal region. The surgeon who operated considered "interference unnecessary" however, and made no attempt to cure the hernia, not even recommending a truss. The swelling noticed at that time has gradually increased, but caused no inconvenience until quite recently. During the past few months it has grown rapidly; its size and the dragging sensation when standing and walking have induced her to consent to a radical operation.

When lying on the back there was no protrusion in the left inguinal region, but upon standing there immediately appeared, from above downwards, a swelling which quickly came to occupy the entire left labia, distorting the vaginal opening. The protrusion when of full size was rather tense. It received no cough impulse, and was not reducible with any justifiable force. Upon resuming the recumbent position it slowly became smaller, and finally disappeared. This symptom was the only one suggestive of hernia of the bladder.

Guided only by anatomical landmarks, there being no protrusion when the patient was lying down, I made my incision in the line of the inguinal canal. The external ring was large, admitting two fingers with ease. Together with the hernia the peritoneal sac had withdrawn into the abdominal cavity. Upon opening the sac, which had to be seized and drawn out of the ring, the abdomen could be entered in every direction without obstruction, save towards the outer, or iliac side. Here appeared a tough body covered with its own peritoneum, that arose deeply in the left pelvis, and was firmly attached to the sac for the space of an inch or more. The examining finger could be passed beneath this adhesion and brought out from below its opposite side. The mass seemed solid, and gave the impression of a dense cord, rather than of a hollow body. A considerable quantity of fat was attached to the exposed surface. It could be delivered from the abdomen, but the adhesion to the sac maintained a firm attachment. The canal of Nuck was open, and the pubic termination of the round ligament could be made out. No intestine presented, and by tracing the protrusion to its origin in the left pelvis it became more than probable that I was dealing with a hernia of the bladder, especially as the left ovary and tube were healthy, and in no way involved in the local pathology. This diagnosis was confirmed by an accidental opening of the hernia while separating its adhesions, which were so well organized as to lead to the conclusion that the entire condition was congenital, or that the adhesions of the bladder diverticulum to the peritoneum, were contracted at least in early life.

Though unintentional, and possibly avoidable, the opening afforded me an opportunity to examine the interior of the bladder, and ascertain the relations the hernia bore to its mucosa. The diverticulum, which was pear shaped, came off from the bladder in the region of the left ureter, the neck or stem being quite large enough to admit my index finger. I was even able to introduce a No. 20 Kelley's rectal speculum into the opening, which gave a good view of the mucous membrane.

The question now arose as to the proper method of treating the vesical pocket. I was at first inclined to excise it close to the bladder, for it was evident that in its present condition the pouch could serve no useful purpose as a urinary receptacle, but as soon as the adhesions that held the process in position were relieved, its muscular walls contracted, and the mass became so much reduced in size as to warrant the belief that it would soon become entirely obliterated, and constitute a functionating part of the bladder. I therefore contented myself by closing the wound with three rows of iodized catgut sutures, the first two rows being interrupted, the twelfth of an inch apart, the third being continuous, including only the peritoneum. Care was taken not to penetrate the mucosa with the first sutures, but this precaution is more binding when silk, or any other non-absorbable material is used, catgut sutures are absorbed before urinary deposits can form about them.

Modified by the conditions, I treated the hernial sac according to the method I have later adopted in all my hernia operations, with a view of utilizing the peritoneum to strengthen the abdominal wall. Briefly, my technique is to whip over the length of redundant peritoneum, and after ligating the excess at the upper angle of the opening, to secure it in that position with a few catgut sutures passed through the abdominal wall, not including its muscular layer. This constructs a pad at a weak point, and at the same time avoids dragging on the parietal peritoneum, which is believed to enter into the etiology of hernia of the urinary bladder, especially in those cases that relapse after a radical operation.

Hernia of the urinary bladder is peculiarly an accident of advanced years, the majority of cases occurring after the sixtieth year. One case however has been reported in a boy five years of age, and another in a girl thirteen years old, but such instances must be regarded as exceptional. The present case was under the usual age for vesical hernia and in the prime of life, though menopaused three years. It has been observed more frequently in females than in males, and the larger percentage of protrusions have taken place through the femoral opening, or in its vicinity. The case here reported was a direct inguinal hernia.

It has been observed that hernia of the urinary bladder is especially liable to take place through an abnormal opening in the abdominal wall, internal to the normal ring, and to follow an unsuccessful radical opera-

tion. The previous operation in this case was on the right side, and resulted in a perfect cure.

Three forms of hernia of the urinary bladder have been described, based upon their anatomical relations. The extraperitoneal, when that portion of the bladder not covered with peritoneum is pushed out of the abdomen, the most common variety. The intraperitoneal, when the bladder with its enveloping peritoneum escapes through the opening, the rarest form, and a combination of the extra- and intraperitoneal, when the hernia consists of the bladder partly covered with peritoneum, and partly of that portion which lies below the reflection of the visceral peritoneum. The present case falls in the second division, for the adhesion of the hernial sac was at the extremity of the diverticulum, and between two peritoneal surfaces. In many of the cases there has been a considerable quantity of fat, "lipocele," found surrounding the vesical protrusion, the attachment of which to both bladder and sac is regarded as possessing considerable diagnostic value. In my case there was very little fat, and that was attached near the adhesion. Usually intestine in varying lengths has been found together with the bladder, there was none in this case.

The etiology of hernia of the urinary bladder through either the femoral or inguinal opening is difficult to explain unless we acknowledge some congenital malformation, or acquired loss of integrity of the bladder wall as primary factors. The bladder lies so well protected behind the pubic arch, and unless distended, insured against mechanical force from within the abdomen, that the collapsed organ is not likely to be pushed through an abdominal ring, or to make a new opening for itself by any sudden pressure; the full bladder would rupture first. It is more probable that either a congenital diverticulum found in a considerable number of instances, exists, or, because of a circumscribed thinning of the bladder walls, its muscular structure becoming attenuated, the organ distends unequally, and bulging at that spot results. The causes of this attenuation may be sought for in diseases of the bladder mucosa, connected with urinary changes. How much allowing the bladder to become habitually distended has to do with the latter condition is uncertain, but there may be more than a casual relation between the habit, especially observed in women, of retaining the urine much beyond the desire to void, and such weakening of the bladder wall as predisposes to hernia. Habitual constipation may lift the bladder out of the pelvis and bring a diverticulum, or bulging in relation with a patulous opening. Given any one of these conditions, such a portion of the bladder may be forced through an enfeebled ring by the determining causes to which herniæ of other viscera owe their origin. If added to this there are adhesions to the mouth of the sac from a previous radical operation for hernia, or intestinal adhesions, should the case relapse, the bladder could easily be carried into the peritoneal sac and become a part of the hernial protrusion. Such an etiology explains a considerable number of visceral herniæ.

It also seems reasonable to believe that undue tension on an unusually relaxed peritoneum in the desire to obliterate the sac, may draw the bladder towards the hernial opening, and develop a condition favorable for protrusion. The technique I follow, above referred to, entirely excludes such a contingency. It will be remembered that in the case here reported the previous operation was on the right, or opposite side, and that the adhesions of the bladder were at the mouth of the sac, rather arresting than otherwise the passage of the diverticulum through the inguinal ring.

The diagnosis of hernia of the urinary bladder before operation is rarely possible, especially if the bladder forms only a part of the protrusion. It may be mistaken for an epiplocele, the bladder being usually enveloped in fat, or for a mixed hernia, failure to elicit intestinal sounds being attributable to the overlying adipose tissue. All that can be said is, that certain conditions being present suggest visceral hernia, while their absence does not preclude such an occurrence. In a relapsing hernia it is always prudent to consider the possibility of involvement of the bladder. Should the hernia re-

main irreducible, its gradual increase with the filling of the bladder, and disappearance as the bladder is emptied, would tend to confirm the diagnosis. Under such circumstances filling the bladder with any fluid, boracic acid solution, and then allowing it to empty, would remove all doubts.

After having opened the peritoneal sac the diagnosis is not always an easy matter. The bladder wall may have become so attenuated as to resemble intestine, but the peculiar adhesion of subperitoneal fat to both bladder and sac when present is sufficiently characteristic to consider the protrusion visceral unless proven not to be. When the bladder is not so attenuated, its normal thickness and opacity should assist in its recognition.

In the second, or extraperitoneal variety of hernia of the urinary bladder, there is no peritoneal sac. Wounding the bladder is almost unavoidable, especially if the nature of the rupture is not recognized before operation, and it rarely is diagnosed.

The method of treating the bladder will depend upon the developments at the time of the operation, after the abdomen is opened. If it is wounded the wound should be repaired immediately, though possibly we are over anxious concerning the danger of urine escaping into the abdominal cavity. In my case a considerable quantity escaped without apparent untoward results. Even when the bladder is not opened, but injured, it is safer to treat this weak spot as a complete incised wound and include the mucosa. The wound will then be repaired with the usual three rows of sutures.

The condition of the bladder itself may require treatment. If a diverticulum forms the hernia, it may seem advisable to excise this near the bladder, especially if there is much narrowing of its neck, a quite unusual finding however. Such a process is a pocket for residual urine, and subsequently for the formation of urinary calculi, and its excision, following the general rules of bladder repair, is to be recommended.

Or if the bladder wall has become very much attenuated through an actual destruction of muscular fibers, or separation of their bundles, that part of the organ has lost its power of contraction, a function that it is not likely to regain. Such a condition is most favorable to retention of urine, with infection, and almost certain cystitis. The question therefore arises, what is the best method of dealing with such a weakened bladder? From a purely surgical standpoint there can be no possible objection to excising the attenuated part, and from the standpoint of future usefulness of the organ there are many reasons in its favor. It may not be thought necessary to open the bladder by incising the mucous membrane, but if the excision is carried only to the mucosa, when the muscular layer is brought together the mucous membrane will be thrown into rugæ, which become favorable locations for the formation of urinary deposits. The cleanest technique will include incision of the entire thickness of the bladder wall, the repair of which if properly carried out need give no after thought.

Though in the case reported a retention catheter was left in the bladder twenty-four hours, I doubt the necessity, or the advantage of having done so. In the first place, there is the danger of cystitis, reduced to a minimum by strict antiseptic precautions, but always to be reckoned with inasmuch as the personal equation of the patient is imperfectly understood. In the second place, the bladder is little likely to become distended during the twenty-four hours following etherization, and at the expiration of that time healing has so far progressed that there is little likelihood of the line of suture giving away, and urinary infiltration taking place. Of course if the patient cannot void urine the bladder should be catheterized, but I think it a questionable routine practice to drain the bladder after this operation.

One other point suggests itself in connection with the treatment after a herniotomy. I refer to the use of a truss, or any apparatus designed to retain the protrusion by pressure at the site of the hernia. Until quite recently this has been the almost universal practice, but we may well question whether it in any measure contributes to the success of the operation, if indeed it is not actually prejudicial. A certain length of time is required for scar tissue to become strong,

and able to assume the functions of healthy structures, but there is no reason to believe that this physiological process is assisted, or even hastened by pressure on the reconstruct ed parts. Any apparatus that does this interferes with the development of the abdominal walls where the pressure is made, and it is this very development that we seek to encourage, a lack of which permitted the hernia to take place. It should be our object to endeavor in every manner to restore muscular tone and strength. If the layers of the abdominal wall have been properly brought together, and secured, and by properly I mean nicely adapted to each other, tissue to tissue; and if, as I believe, the peritoneum is utilized as a cushion to resist pressure from within, cases do better without a confining apparatus. The walls are stronger, and assume their normal function earlier. Beyond straps and a light bandage—this dressing is a concession to the patient's feelings, and principally to afford relief from the inevitable soreness that immediately follows a laparotomy—I use no support after my abdominal operations. For the first twenty-four hours, especially if there is much vomiting, patients crave support, and derive from it the additional mental comfort that they can move without injury to themselves, but beyond this I consider anything more than a simple wound dressing, and a light bandage harmful. Any tight binding of the abdomen interferes with peristalsis, and so favors intestinal inactivity, a sequela we wish to avoid.

PLACENTA PRÆVIA

A Study of 10,600 Cases

By ELLICE McDONALD, M. D., New York City, New York

OF all obstetrical complications in private practice, placenta prævia is the most dreadful. The few warning symptoms of hæmorrhage, etc., in a healthy woman tend to cause the patient and the patient's family to minimize the gravity of the condition, which is more frequent among women who have had children before without trouble and are accustomed to the sight of vaginal menstrual blood, so look upon the first hæmorrhage in placenta previa as a small matter and not out of the usual course of affairs. In addition, the large fœtal mortality under any treatment makes the obstetrician realize that the chances are less than even that the baby will live and so he is disheartened at the outset by the prospect that the child will probably die or be delivered in a weakened or premature condition.

However, the comparison of the mortality tables of various succeeding epochs shows that the percentage of deaths of mother and children is steadily lessening and that the treatment which gives the least mortality of children also saves the greatest proportion of mothers.

FREQUENCY

The frequency of occurrence of placenta prævia is very variously estimated. Müller's (1) statistics of 876,432 labors gives it as once in 1,078 cases; but many others have reported widely varying frequency. From reports of clinics for the last two years in 183,389 labor cases placenta prævia was found once in 160 labors. This is probably a more just approximation of its frequency, as Müller's statistics were published in 1877 when scientific accuracy was not the rule. The obstetric clinics, of course, have more than their proportion of these cases and placenta prævia is not found so often in private practice. Varying estimates of its frequency are given, but it is probable that it is found in private practice in about half the proportion of clinic cases or about 1 in 300 labors. This, however, is purely estimated, as no statistics are available.

ETIOLOGY

Only one fact is known in regard to the etiology of placenta prævia, it occurs much more frequently in multiparæ. Statistics the last two years, where the parity was men-

tioned, show one primipara to nine multipara, and the more children the more likelihood there is of placenta prævia. This is well shown by Doranth's (2) analysis of 30,796 labors amongst whom placenta prævia was noted in 0.17, 0.43, 0.65, 1.37, 1.28 and 3.39 per cent, according as the patients had borne 1, 2, 3, 4, 5, or 6 children respectively; while when they had borne 7 to 10, the percentage was 5.51. Warren (3) found that, of his cases of placenta prævia, 16 per cent were primparæ and 49 per cent had five or more labors previously. Strassman (4) has also shown that the rapidity with which the labors have followed has an influence upon the incidence of placenta prævia. The average age of his 231 patients was 33 years and the average number of labors 6.38. Other statistics assert the frequency with which the condition is found in multiparæ in comparison to primiparæ and it is a fortunate thing it is so; for the multiparous cervix is much easier of dilatation than is the primiparous. This works to lower the mortality.

CAUSATION

Very little is definitely known in regard to the mode of formation of placenta prævia. Formerly it was thought to be due to a low implantation of the ovum in the lower segment of the uterus or to the attachment and reimplantation of a normally situated ovum. The hypertrophic and folded mucosa of the internal os and the angulation of the uterus at this point may combine to practically obliterate the orifice of the internal os, so that the ovum does not escape from the uterine cavity. It has been suggested that an unhealthy condition of the uterine mucosa may predispose toward the condition. The relative thinness of the decidua developed in the lower part of the uterus or isthmus explains the deep penetration of the low implanted ovum into the muscularis or even deeper into the substance of the wall.

To properly understand the mechanism of placenta prævia the anatomy of the uterus must be understood. The uterus must be divided into three different segments, not only in regard to the physiological changes in them during pregnancy, but also in regard to pathological processes in the formation of the placenta. The cavum uteri extends from the fundus to the anatomic internal os, the isthmus or lower third of the fundus extends from the anatomic internal os to the histologic internal os and the cavum cervicis is below the histologic internal os.

The mucosa of the isthmus in contrast to that of the cervix shares in a most characteristic way in the decidual reaction, although the decidual swelling is only one-third of that of the body of the uterus. On the other hand, the isthmus more resembles the cervix in its muscular tissue and is, by passive stretching, more concerned in the course of pregnancy in the enlargement of the ovisac and is thus transformed into the lower uterine segment. The isthmus normally affords nourishment for the membranes; but, in placenta prævia, the implantation seriously affects the condition of the wall. The embedding of the placenta has a destructive effect penetrating the thin decidua into the muscular layer in such fashion as to injure the wall of the isthmus, reducing its elasticity and contractile power.

The researches of Aschoff (5) make it probable that some instances of placenta prævia arise from cleavage of the decidua and low implantation of the ovum. The os is finally obliterated by the growth of the placenta. Hofmeier has also suggested that the condition may occur "from the development of the placenta which takes place in the reflexa of the inferior pole of the ovum." He and Kaltenbach (6) claim that this reflexa of the lower pole gradually bridged over the internal os and eventually became fused with the decidua vera. The placenta was then from its fusion situated at the lower pole. This is, however, probably the exceptional mode of formation of placenta prævia and a low implantation with cleavage of the decidua vera and obliteration of the os is the common one.

The effect of changes in the uterine wall from inflammation or atrophy as a result of repeated and frequent pregnancies has been shown by Strassman (7) to predispose toward placenta prævia. Such conditions limit the amount of blood going to the placenta prævia and cause it to spread over a greater area in order to get the requisite nourishment. This is borne out by the common occurrence of

large surface and thinness of the placenta in this condition. The placenta spreads down and overlaps the internal os and so forms the placenta prævia. When the cervix is included, the overlapping is due to a tonguelike process from the placenta situated at the isthmus. As the mucosa of the isthmus and cervix responds less actively than that of the fundus to the decidual reaction, the placenta is required to be thin and expanded. The decidual reaction, similar to that of tubal pregnancy, causes the villi to grow deeply into the muscular bundles of isthmus or cervix often to penetrate almost completely the thickness of the wall.

The uterine wall thus thinned is easily torn and, having lost much of its elasticity, hæmorrhage is common both before and after separation of the placenta. The placenta may be so adherent as to be separated with difficulty and with marked loss of blood. The cervical tissue is readily lacerated owing to its increased vascularity and the deep implantation of the villi.

This destructive action of the placental villi is more marked when the seat of the ovum extends into the cavity of the cervix and the ovum roots itself on the muscular tissue there. The process of thinning and weakening of the lower segment of the uterus explains the proneness to laceration.

VARIETIES OF PLACENTA PRÆVIA

The condition is usually classified into central or complete, incomplete or partial, and marginal. In the first, the internal os is completely covered by placental tissue; in the second, the placenta encroaches slightly upon the os and, in the third, the placenta is implanted higher up. The classification is difficult to make and often inexact; for a placenta which may cover the opening, when the os is undilated, will often only slightly encroach on the margin when the os is fully dilated.

An anatomical classification has been suggested by Aschoff as a result of his researches upon the anatomical pathology of the uterus in this condition. Central placenta prævia is called *placenta prævia totalis*, the wall of the cervix being included within the field of placentation. Partial placenta prævia is called *placenta prævia isthmica* and involves not only the corpus but the greater part of the whole of the isthmus, and the deep seated or marginal variety is called *placenta prævia simplex*, being implanted on the corpus uteri and to a small extent upon the isthmus.

These terms have little advantage over the former expressive ones of central or complete, partial, and marginal and the old nomenclature should be retained; but these investigations have added a new meaning to them. In complete or central prævia, the placenta is implanted upon cervical tissue, so weakens the cervical wall and greatly increases the dangers of the condition from hæmorrhage. In partial placenta prævia, the greater part of the placenta is implanted on the isthmus and in marginal, the lesser part rests on the isthmus, the greater part on the corpus.

It is important in the study and report of series of placenta prævia that clear distinction be made between the complete and partial forms, for they differ in their treatment, in mortality of mother and child, and in their pathological anatomy. The mortality should be classified under the different heads of complete, partial, and marginal — or at least under complete and incomplete as here are the greatest differences in mortality and treatment.

MORTALITY

The classification given here of all cases which could be collected is of interest in the study of results and treatment of placenta prævia. One great difficulty in the consideration of the mortality of various operators and clinics is that reports are not made with any system of classification, so that it is often difficult to arrive at the various mortality under the separate heads of complete and incomplete. The fœtal mortality is also reckoned variously — some considering only viable children, some considering all deaths of babies at labor, the direct mortality, and some considering all pregnancies and deducting from them the number of children alive after a few days, the ultimate mortality. This last method, of course, is correct and gives the relation of babies saved to the total number of cases of placenta prævia. In the series of cases, hereafter tabulated, it may be consid-

ered that, if the mortality of children in a given series is large, the number is in relation to all cases of pregnancy, and if small, the percentage is that of babies dying after viability and being alive at the time of treatment — a wholly false estimate of the true fœtal mortality.

There have been two great collections of statistics upon placenta prævia — that of Müller and Read (51) and that of Holmes (52). Müller in 1877 took Read's statistics collected in 1861 and added his own thereto. This gave the combined statistics of the preantiseptic period in all 1,975 cases with a maternal mortality of 23.6 per cent, and a fœtal mortality of 63.1 per cent. In complete placenta prævia, the mortality of mothers was 30.9 per cent and of children 67.5 per cent; in incomplete placenta prævia, the mortality of mothers was 15 per cent and of children 51.6 per cent.

Holmes' statistics included all cases reported from 1877 to 1905, the antiseptic period, and amount to 2,756 cases with a maternal mortality of 7.72 and a fœtal mortality of 54.1 per cent. In complete placenta prævia, the mortality of mothers was 13.4 per cent and of children 80.5 per cent; in incomplete placenta prævia, the mortality of mothers was 4.3 per cent and of children 50.5 per cent.

The statistics collected by me in the following table are of cases reported since Holmes' article in 1905 and amount to 5,869 cases to which are added Holmes' collection of cases, making 8,625 cases treated during the antiseptic period.

CONSIDERATION OF MORTALITY

A short consideration of these statistics may teach us something of the course and mortality of placenta prævia. First the mortality has not diminished much of later years, although there is a great drop from the maternal mortality of 23.6 per cent of the preantiseptic period to 7.22 per cent of later years.

Müller is 1877 states that, of 212 cases, more than a quarter died from infection, and these deaths have been now largely prevented; as many of the series reported in this table go back many years, it is hardly fair to compare the mortality with that of Holmes' table; still the maternal mortality is only slightly lower than in 1905.

This small decrease in the mortality requires some explanation. Holmes' table included many clinic statistics while the present one includes some reports of cases treated outside of hospitals with a higher mortality.

	Total Cases			Complete			Partial and Lateral		
	No.	Mortality, Percent. of		No.	Mortality, Percent. of		No.	Mortality, Percent. of	
		Moth'r	Child		Moth'r	Child		Moth'r	Child
Holmes (8)	2756	7.72	54.1	350	13.4	80.5	1022	4.3	50.5
Hannes (9)	246	6.6	..	..	..	..	..	..	..
Blumreich (10)	74	2.7	..	..	..	..	..	..	..
Thies (11)	179	3.	60	..	..	..	..	..	..
Richter (12)	83	2.4	53	..	..	..	..	..	..
Neu (13)	50	8.	..	..	..	..	..	..	..
Hammer (14)	107	7.4	54	..	..	..	..	..	..
Novak (15)	237	5.9	79	..	..	..	..	..	..
Schauta (16)	438	7.	57	..	..	..	..	..	..
Kronig (17)	380	6.	33	..	..	..	..	..	..
Miller (18)	10	20.	..	..	..	..	..	..	..
Zweifel (19)	178	7.8	71	..	..	..	..	..	..
Bonnaire (20)	171	18.	..	..	..	..	..	..	..
Merkel (21)	59	3.3	32	..	..	..	..	..	..
Maison (22)	154	14.	75	..	..	..	..	..	.
Warren (23)	94	6.3	53	..	..	..	..	..	..
Olöw (24)	41	2.4	40	..	..	..	..	..	..
Hofmeier (25)	100	8.	..	..	..	..	..	..	..
Burger and Graf (26)	342	5.8	55	..	..	..	..	..	..
Füth (27)	726	19.7	..	..	..	..	..	..	..
Bourretiére (28)	92	9.7	72	..	..	..	..	..	..
Demelin (29)	166	6.	48	..	..	..	..	..	..
Freund (30)	69	10.	52	..	..	..	..	..	..
Hammerschlag (31)	191	6.2	82	..	..	..	..	..	..
Müller (32)	26	7.7	90	..	..	..	..	..	..
Nordmann (33)	45	2.2	..	..	..	..	..	..	..
Pipo (34)	56	5.3	55	..	..	..	..	..	..
Viana (35)	101	6.9	59	..	..	..	..	..	..
Meurer (36)	52	10.	67	..	..	..	..	..	..
De Snoo (37)	32	12.5	53	..	..	..	..	..	..
Mauchotte (38)	183	2.2	45	..	..	..	..	..	..
Van der Hœven (39)	21	4.9	28	..	..	..	..	..	..
Treub (40)	120	11.7	55	..	..	..	..	..	..
Fry (41)	35	0	..	..	..	..	..	..	..
De Lee (42)	64	6.2	..	..	..	..	..	..	..
Norris (43)	18	0	..	..	..	..	..	..	..
Hirst (44)	29	3.4	..	..	..	..	..	..	..
Davis (45)	15	6.6	..	..	..	..	..	..	..
Lying-In Hospital (46)	311	11.	58	115	14.8	59	182	8.2	58
Mason and Williams (47)	155	14.2	64	55	23.6	72	100	9.	59
Hauch (48)	240	9.1	62	60	15.3	65	84	5.8	44
Gussakow (49)	137	6.	..	25	24.	..	112	1.7	..
Hussey (50)	42	2.3	..	7	14.2	..	35	0	..
Totals	8625	7.22	55.5	612	15.5	71.9	1535	4.8	58.9

In this table, the total number of the cases are noted: but the mortality of mother and child is given in percentage in order to avoid unnecessary reduplication and for the sake of comparison. Holmes' most exact figures had a small error in the percentage mortality of the mothers, 7.36 per cent instead of 7.72 per cent, and, with his permission, this has been corrected.

Füth's statistics of 726 cases, for example, were collected from reports of midwives of Coblentz and were treated by them and this has helped to raise the mortality.

The maternal mortality of complete placenta prævia is about three times that of incomplete, partial, or marginal. Complete placenta prævia occurs about once in four times of all forms. The mortality of the complete form has been reduced, from the preantiseptic days, by about half (30.9 per cent to 15.5 per cent) while the mortality of incomplete placenta prævia has been reduced to one-third what it was (15 per cent to 4.8 per cent).

The greater mortality of the complete form of placenta prævia over the incomplete variety is not due as much to its situation as to the fact that the cervical wall is more destroyed and is made more liable to hæmorrhage from the lessened contractibility due to this destruction. The two forms are analogous to the two forms of ectopic pregnancy resulting in tubal rupture and tubal abortion. Tubal rupture is less frequent, more dangerous, and sudden in onset, due to the destruction of the tube wall by the imbedded ovum, yet the situation of both is in the tube.

It is evident from the difference in mortality in the two forms of this condition that we have to do with two distinct forms of disease. This is also borne out by the pathology of the condition, as described by Aschoff, where the situation of the placenta upon the cavity of the cervix makes a different form of imbedding of the villi and a distinct pathological anatomy. The incomplete form where the placenta is imbedded on the isthmus of the uterus causes less destruction of the uterine wall and has a mortality about one-quarter of the complete variety.

It is, of course, often difficult to decide clinically between the two forms — as is shown by the varying relation of the percentages of the complete and incomplete given in the table. Pinard (53) has advanced a method of examination of the point of rupture of the membranes. If this is nearer the placenta than 10 cm., the length of the isthmus, he claimed that the insertion was incomplete and, if near the placenta, central. This offers a large factor of error, but it is interesting to note that in observations in 15,000 labors, Pinard has never seen a complete placenta prævia where the center of the placenta, the vessels, was exactly over the center of the cervical outlet.

The mortality of the children (55.5 per cent) in the antiseptic era has been but little reduced from that of the preantiseptic period (63.1 per cent). Any advance in treatment which has been made has saved mothers at the expense of the children.

The total statistics are not all subdivided into the two classes, so that, while there is a slight decrease in the total mortality, the comparative mortality of the children, in reports that are subdivided, is greater in the antiseptic than in the preantiseptic era — thus the fœtal mortality of such cases as are subclassified into complete and incomplete, gives an increase in fœtal mortality from 67.5 per cent of the preantiseptic to 71.9 per cent of the antiseptic times in complete, and from 51.6 per cent to 58.9 per cent in the incomplete. So that, while there has been a great reduction of the maternal mortality, the expected reduction in the fœtal mortality has not occurred and mothers have been saved at the expense of children. It should, however, be remembered that the statistics are very uneven in regard to the fœtal mortality, some reckoning it upon viable children only, which gives a small mortality, others reckoning it upon all cases, whether premature or not, which gives a larger direct mortality, others again add to this those children dying within a few days after birth, which gives the true or ultimate fœtal mortality. So it is probable that the fœtal mortality is greater than that taken from the combined tables.

CHANCES OF SURVIVAL OF CHILDREN

Many children die soon after birth in proportion to the degree of their prematurity. Mason and Williams (54) state that, of 114 children born alive, 38 per cent died within a few days. Of the children born alive at full term, 20 per cent died afterwards; of children born alive at 8 months, 48 per cent and of children born alive at 7 months, 71 per cent died within a few days of delivery; and, as only 36 per cent of all their children

were born alive, it will be seen that the mortality of children is considerably increased after delivery. Zweifel (55) in 178 cases of placenta prævia, found that 78 children were born alive and of those weighing less than 2500 gm. (5½ pounds) only nine left the clinic alive and of those weighing more than that amount, 39 left the clinic alive, i. e., 41 per cent of those born alive dying within a few days.

It may be seen from these reports that the chances of life of the child are very precarious, not only from the dangers of maternal hæmorrhage, mal-nutrition, accidents of delivery; but also from the danger of dying after delivery from prematurity, weakness, and exhaustion. The danger of death to the child is increased in direct proportion to its smallness of size and prematurity.

In addition to these risks to the fœtus, it should be remembered that many cases of early placenta prævia result in abortion at a time before the ovum can be classed as a fœtus. Many and varying estimates by various writers are made ranging from twenty to sixty per cent of cases of this complication, but, as it is a matter upon which accurate observation is impossible, the number of such occurrences must remain an approximate estimation.

DANGERS OF PLACENTA PRÆVIA

Hæmorrhage and its results are the chief danger in placenta prævia. This bleeding usually occurs some time before full term and comes on as a dribbling of blood without pain. It quite often occurs at night and the woman is awakened by a feeling of warmth at the vulvar parts. The first hæmorrhage is not usually a severe one and is but seldom associated with straining or effort. The patient does not as a rule go into labor immediately following the hæmorrhage. Of Füch's 726 collected cases, only 25 per cent had pain immediately succeeding the hæmorrhage and in the remaining 75 per cent an interval of days, weeks, or months occurred. All but three of the women applied for medical aid before delivery on account of the hæmorrhage. Only 3 per cent of the 726 women had no hæmorrhage before labor pains occurred.

The first bleeding usually terminates spontaneously and leaves the woman but little weakened. However a second one is not long in coming and often there is a persistent dribbling, so very weakening to the patient. The second and succeeding hæmorrhages are more likely to follow upon straining or effort. In placenta prævia approximately 70 per cent of all deaths are due directly to hæmorrhage and exhaustion, and the weakness and lack of resistance following the bleeding is indirectly responsible for many who died from infection, air embolism, shock, uterine rupture, and other causes. In Füch's series, there were 141 deaths of which 98 died from hæmorrhage and a large percentage of the rest from infection due to lessened resistance. The great danger is hæmorrhage before, during, and after labor, and treatment must be directed against it.

During labor, the natural straining with the labor pains is one of the main dangers in increasing the bleeding. The hæmorrhage will continue after the cervix has been stretched or dilated until the placenta is removed or pressure brought to bear upon the cervical vessels. The cervical vessels do not pass through the uterine contractile tissue but go directly to the cervix from the uterine artery and vein. Convelaire's (56) radiographs of the pregnant uterus show branches going directly from the artery to the cervix, so that contraction of the body of the uterus does not cause pressure upon them.

POSTPARTUM HÆMORRHAGE

Postpartum hæmorrhage also occurs in about 12 per cent of all cases based upon recent series. This is more common in complete placenta prævia and is probably due to the weakening and destruction of the cervical wall due to the imbedding of the placenta in that part, as is well shown by Aschoff's investigations before referred to. Hæmorrhage after delivery often comes on at an interval after the birth of the baby. The delivery of the child causes an immediate fall in the blood pressure of the mother, but this fall is soon recovered and, when the pressure returns to its former level, the postpartum hæmorrhage occurs.

In cases of postpartum hæmorrhage, the placenta is often adherent to its site and requires to be brought away by manual extraction. This is frequently followed by a renewed rush of blood. In four of Warren's (3) 14 cases of postpartum hæmorrhage in this condition the placenta was adherent, although there was no hæmorrhage after delivery in two other cases of adherent placenta.

There is also danger of persistent and severe hæmorrhage from cervical lacerations. These occur readily owing to the weakened condition of the cervical wall, its excessive vascularity, and softness. Often the laceration extends so high that it cannot readily be sutured, and packing is not of avail. The bleeding is often only dribbling in character, but may be free and severe.

Postpartum hæmorrhage may occur in placenta prævia treated by Cæsarean section if the cervix has been dilated by labor pains previous to operation and, while the advisability of Cæsarean section is doubtful in any case, it is positively contraindicated where there has been cervical dilatation and hæmorrhage.

INJURIES OF DELIVERY

Laceration of the cervix is the most common injury in placenta prævia. It is most usually due to delivery of the head after version through a cervix which is not fully dilated. The friability of the cervix from placental erosion causes laceration to occur with readiness. It sometimes extends to become a uterine rupture and cause severe hæmorrhage. Hauch (48) in 240 cases found a considerable laceration in 11 with two deaths from hæmorrhage.

Laceration may also be caused by manual dilatation of the cervix by Bonnaire's method followed by version and extraction. Of 171 cases reported by Bonnaire (20) after this method, the cervix was lacerated in 20, in 5 the tear extended into the uterus and in 2 involved the vaginal wall. Of the patients with lacerations, 6 died. Laceration may also occur from the elastic rubber bag or hysteurynter, introduced into the cervix to stop hæmorrhage. Of 144 cases treated by the elastic bag by Hauch (48), there were 9 lacerations and in the majority of these a weight of 2 pounds had been attached to the bag to hasten dilatation. In cases where the bag is inserted without any weight, laceration is not so common. The weight was only attached to the bag in those cases where there was considerable hæmorrhage or where the bag did not completely control the bleeding.

Laceration of the cervix may also occur from the tearing out of the volsella forceps applied to the cervical lip for traction in inserting an elastic bag or in packing the cervix with gauze.

Laceration of the perineum is not infrequent in placenta prævia. The child is extracted usually with some haste and due time is not taken in the delivery of the after coming head. Laceration is usually easy to avoid, but the operator is occupied with the greater dangers of the patient and forgets the care of the perineum. Complete perineal laceration is not infrequent and is caused by the chin of the child pointing directly backward and impinging against the upper part of the perineum. These injuries, slight in themselves, add considerably to the dangers of death from the time they require to repair, keeping the patient under ether when she should be in bed.

The vaginal surface is sometimes bruised and rubbed raw while packing the cervix with gauze, due to dragging the gauze over the mucous membrane as it is inserted into the cervix. This injury is, of course, easy to avoid.

INFECTION

From a study of a number of clinic statistics included in the table, infection is shown to be the cause of death in from 1.2 to 2.2 per cent. Richter (12) whose mortality from infection in 83 cases of placenta prævia was 1.2 per cent had 26.5 per cent of morbidity.

Infection results most frequently in cases which have had much vaginal manipulation. Among cases in which the cervix has been tamponed with gauze, the percentage of infection is greater; prolonged retention of the elastic bag in the uterus also is said to predispose toward infection. Lacerations of the cervix and other traumatism by lowering resistance and causing granulating wounds help toward the same end. The proximity of the

raw placental site to the vagina, and vaginal lochia which usually contains infectious organisms, is one of the dangers of the puerperium.

MALPOSITION

Abnormal position of the fœtus is a not uncommon complication of placenta prævia. The situation of the placenta, occupying as it does the space which should be occupied by the child's head, forces the head to be elsewhere. Müller in his statistics found 272 transverse and 107 breech positions of 1,148 cases. There was thus abnormal position in one-third (33 per cent) of all cases. This malposition is, however, not always a detriment, as it makes version easier, as the child is half turned already with the head out of the false pelvis.

ADHERENT PLACENTA

The placenta is often adherent and this is the case more often in complete placenta prævia on account of the more extensive infiltration of the cervical walls. In 160 cases in which this complication was noted, there was adhesion to a greater or less degree in 67 cases (42 per cent). The placenta frequently requires manual extraction, even when broken into fragments by thrusting the hand through it to do version and breech extraction.

TWINS

Plural pregnancy is more common in placenta prævia than in the ordinary run of cases. Winckel states that, in his experience, twins are four times as common in this condition as customarily. Warren (3) found twins twice in 94 labors where the usual ratio is 1 to 80 labors. In these cases, the twins are usually weak.

AIR EMBOLISM

The danger of air embolism is very variously estimated. Peters (57) is so convinced of its frequency and danger that he advised the delivery in placenta prævia should be done under water in a bath tub, sterilized by boiling water and alcohol. He had a case in which death occurred as he was seizing the foot after version in placenta prævia. Some observers on the other hand deny the probability of its occurrence and ascribe those sudden deaths in placenta prævia to shock.

Undoubtedly shock is a great factor, as in the unweakened organism, large quantities of air must be introduced before death is caused. In the dog often 200 cc. of air (58) is required if injected slowly, before a fatal result is obtained. If the air is introduced rapidly, a smaller amount is often fatal. Delbet (59) places this amount at 5 cc. for each five kilos of body weight, although he says he has injected 80 cc. in an 8 kilo dog without evil results. Undoubtedly some cases of capulatus ærogenes infection are mistakenly called air embolism, but, in spite of the doubt of the pathologists as voiced by Welch (60) as to the possibility of air embolism, there occurs in placenta prævia a number of sudden deaths which cannot be explained upon the theory of gas sepsis or pulmonary embolism. Take for example, the case of Cordwent (61). A healthy young woman of 28 expelled child and placenta upon the floor while standing; the baby fell dragging out the placenta. Immediately a gurgling sound was heard, and the patient after standing a minute, fell on the bed and died instantly. Autopsy showed air bubbles in the uterus at the placenta site. The coronary vein of the stomach was full of air. The right side of the heart was slightly gorged and, when the auricle was punctured, air bubbles escaped from its contained blood. Other cases have been reported by Heckford (62), Davidson (63), Braun (64) and others, while Lauffs (65) has collected 18 cases from the literature. Greene (66) has presented the arguments pro and con and his complete article may be well referred to by those interested.

The death in air embolism is due to cardiac insufficiency from a mechanical cause, as when the air enters the right ventricle, the auriculoventricular valve does not close and the light elastic air in the venæ cavæ allows regurgitation from the auricle. In the form of a coarse froth, the air is churned backward and forward in the venæ cavæ with each contraction and the heart's effort is lessened. As a result little or no blood reaches the left ventricle and the whole circulation including the coronary is blocked, with consequent bulbar anemia causing respiratory failure and cardiac anemia causing weakness of the heart muscle.

In experimental work on dogs, the respiration fails first, although the respiratory failure is dependent upon the heart disturbance. Air is not usually found in the left heart and the depression is not due to the blockage of the pulmonary vessels with air.

Although death from air embolism in placenta prævia is a comparatively rare occurrence, all possible means should be taken to guard against it by preventing the possibility of negative pressure in the internal sinuses and veins.

This is best done by not raising the pelvis, and keeping the shoulders higher, by allowing as little air as possible within the uterus during manipulations and by controlling the fundus closely with the hands so as to allow no dilatation of the uterus after delivery.

Should air embolism occur, artificial respiration is the best hope; it should be done forcibly and continuously with direct pressure over the cardiac area in the attempt to disperse the air. Blair and McGuigan (67) report good success in resuscitation in dogs by the injection of a large single dose of adrenalin chloride in salt solution. They introduced saline solution by a vein near the heart and injected the dose of adrenalin into rubber tube near the canula in order that it go to the heart in strong concentration. Excessive circulatory stimulation resultant from it may be relieved by bleeding.

This treatment has never been used in human beings, but they suggest that it be tried with a dose of 2 cc. of adrenalin chloride 1-1000. However, as the necessary preparations take some time, artificial respiration must remain the chief treatment.

DIAGNOSIS

Hæmorrhage is usually the first sign of placenta prævia and comes on as a rule without straining or excessive effort. It rarely appears before the seventh month; but is more frequent during the last month of pregnancy. This hæmorrhage as a rule comes before the labor begins; in about 75 per cent of cases, there is an interval between the first hæmorrhage and labor. Very few cases have no bleeding at all before labor pains begin. This first bleeding usually terminates spontaneously.

Examination of the woman at this time usually shows a cervix which is dilated sufficiently to insert a finger and feel within the cervix the roughened outside surface of the placenta covering the os. The abrupt margin of the placenta may sometimes be felt through the abdominal wall above the symphysis and at the posterior vaginal fornix the rear margin may be palpated by the examining finger.

When the cervix will not admit one finger, the placenta may be felt between the fœtal head and the finger as a soft intervening cushion. Attempts to produce ballottement drive this cushion against the head. The cervix is usually shorter and softer than in normal pregnancy. Manipulations of the cervix produce bleeding easily. It should be remembered that malposition is associated with placenta prævia in approximately one-third of all cases.

TREATMENT IN GENERAL

The treatment of placenta prævia must be considered in general and then as to the various types of the disease.

The indications to be met are the control of hæmorrhage and the delivery of the child without traumatism, mutilation, or delay.

In no condition in obstetrics is delay so dangerous to mother and child as in placenta prævia. Delivery should follow the first hæmorrhage. The only exception to this rule is where the patient can be put to bed in a hospital and carefully watched. Delay is then permissible as long as the pulse is below 100, and the mother and child in good condition. Delay is, even then, not without danger, but often the intense desire for a live child will excuse the chances taken.

The improvement in results comes not so much from any method of treatment as from early delivery, and early delivery is as advantageous to the child as to the mother. Delivery should immediately follow upon complete dilatation of the cervix, but delivery should be without traumatism.

The danger of hæmorrhage is increased by strong internal contractions and the probability of cervical laceration is much increased.

The ideal course in placenta prævia, is dilatation of the cervix with mild labor pains and little natural straining. For this reason if pains are strong, particularly if an elastic bag is inserted, it is usually well to control them by a hypodermic of morphine, gr. $\frac{1}{6}$ to $\frac{1}{4}$ and atropin gr. $\frac{1}{100}$. Atropin is a useful uterine sedative and has a distinct effect in preventing severe contractions. As long as the membranes are unruptured, the greatest safety of the mother lies in prohibiting strong pains or straining.

If hæmorrhage is severe, hypodermoclysis or venous transfusion should be done. It should be remembered that normal saline solution does not consist of one dram of sodium chloride to a pint of water; but other salt should also be included. Evil results have been reported from using sodium chloride alone. A useful formula is as follows: Sodium chloride 9.0 gm.; calcium chloride 0.1 gm.; potassium chloride 0.25 gm. to one liter of water.

The choice of anæsthetic is of considerable importance. Anæsthesia is not as a rule required for the insertion of the elastic bag; but when version and extraction or other operations must be done, anæsthesia is necessary. Chloroform should be given with great care in the presence of hæmorrhage, particularly if that hæmorrhage is sudden. I have come to fear it greatly in placenta prævia and always substitute ether where possible. The pregnant woman does not bear ether as well as chloroform; they are apt to be troubled with mucus and bronchial irritation, possibly due to laryngeal congestion.

Still the danger of sudden collapse and shock is so great in placenta prævia that ether should be the anæsthetic of choice.

TREATMENT OF COMPLETE PLACENTA PRÆVIA

In considering the treatment of this condition, it should be remembered that we have to do with a disease which under the best clinic auspices kills one in six of the mothers and about three out of four babies. The greatest danger to both mother and child is from hæmorrhage and to it must the treatment be directed. The chances of saving a child are so small that the mother's risk must not be increased on that account. The mother, as Holmes says, is a social entity, the child at best a possibility. The mortality of children under 20 years of age is about 37 per cent and the ordinary child has as much chance of living until 20 as the woman of 55 has of living to 77.5 years. These chances of life of the child are decreased in placenta prævia because of its weakened condition. Delay in delivery after the first hæmorrhage but weakens the child and increases the maternal risk.

The child is premature in 60 per cent of all cases and death after a few days occurs in from 15 to 71 per cent of all babies, depending upon the degree of prematurity, so that the chances of life for the child are not great in complete placenta prævia.

The danger from hæmorrhage is not only from collapse after one or two hæmorrhages, but the risk of sudden shock after repeated small hæmorrhages. All surgeons know how little resistance those patients have who suffer from repeated hæmorrhages, as from uterine fibroids, and placenta prævia cases are no exception to the rule.

For these reasons then, the indication for treatment of complete placenta prævia is immediate stoppage of the hæmorrhage with little consideration for the life of the child.

CENTRAL PLACENTA PRÆVIA WITH DILATED OS

When the cervix is fully dilated, the indication is clear. Immediate delivery of the child controls the hæmorrhage and offers the child the best chance of life. Delivery may then be done by Braxton-Hicks version and immediate breech extraction. This should be done carefully and slowly so as not to cause any mutilation of the cervix or perineum.

It is usually well, if condition of the patient allows, to dilate the vagina and stretch the perineum with the hand. This makes the difficulty of breech extraction much less. If the placenta completely covers the dilated cervix, it is better, when thrusting the fingers into the uterus to do the bimanual version, to attempt to pass two fingers around the anterior lobe of the placenta under the symphysis rather than through the center of the placenta. The risk to the child is increased

by piercing of the placenta by thrusting the hand through the center and, as the geometric center of the placenta hardly ever coincides with the center of the cervix, two fingers can usually be passed and they are sufficient to do the bimanual version. In case the edge of the placenta cannot be passed, the obstetrician can always fall back upon piercing the placenta, although after this procedure hardly a single child survives, so it is useless to try to hasten the extraction of such a child.

Extraction should immediately follow version only when the os is fully dilated or nearly so, because of the danger of cervical lacerations and uterine rupture.

COMPLETE PLACENTA PRÆVIA WITH UNDILATED CERVIX

Under these circumstances, immediate control of the hæmorrhage is more difficult. The amount of the dilatation of the cervix is not sufficient to allow the passage of the fœtal head and the bleeding must be controlled until the proper dilatation is obtained. This control of hæmorrhage may be obtained in one of three ways: (1) By Braxton-Hicks' version, bringing down one foot so that the fœtal body acts as a tampon and delayed extraction; (2) by the use of the inflatable elastic bag of Champetier de Ribes, or (3) by tamponage of the cervix with gauze.

If the child is dead or premature, version with delayed extraction answers well. It usually sacrifices the child, but in most cases controls bleeding. If the cervix is half dilated, version with delayed extraction is commonly successful, because the cervix is usually soft and the half breech causes dilatation within a short time.

If, however, the child is alive and the os small or not readily dilatable, the choice of treatment must be among the three, with the preference to the elastic bag, where possible.

The elastic bag or hysteurynter gives good results, provided certain conditions are observed. First, the operator must be skillful in its use and observe all antiseptic precautions. The danger of infection is said to be increased but, in 246 cases treated by the inflatable bag, Hannes (9) found only 0.9 per cent mortality from infection; so that it is evident that in good hands the mortality from infection is even less than in other forms of treatment. Second, the bag must be introduced within the ovum. If the bag is placed outside the membranes, the maternal mortality is very much greater, as is shown by the report of Hauch of 96 cases, in which the bag was introduced outside the ovum with a mortality of 15.6 per cent, and of 48 cases in which the bag was introduced within the ovum with a mortality of 2.1 per cent.

In cases where the placenta does not completely cover the half dilated os, the introduction of the bag within the membranes is comparatively easy; but when the placenta completely covers the os and the bag cannot be passed around the anterior lobe, it becomes a question whether it is better to pierce the placenta with the bag or to do a bimanual version by the insertion of two fingers aided by outside manipulations with delayed extraction of the child after the foot had been pulled down.

The choice between these two methods under such circumstances will depend upon the condition of the mother and child. The bag treatment improves the chances of the child; but if the child is dead or premature, this does not have weight. A premature child, being small with a soft cranium, is not so likely to tear the cervix. If the mother is in great weakness from hæmorrhage, delayed extraction after version will probably stop the hæmorrhage more quickly, as, with the bag after the os is dilated, delivery must still be effected.

Altogether the rule may be laid down that when the os is partially dilated with a live child, the bag treatment offers the best results when it can be introduced into the ovum and when urgent symptoms are not present. In 387 cases where the bag alone was used and introduced into the ovum where possible, the maternal mortality was 5 per cent. The most successful of this number was Hannes' (9) 143 cases treated by the bag alone with no deaths from hæmorrhage, although there were 8 deaths from other causes, as previous infection, eclampsia, etc. The hystereurynter reduces the mortality of the children from 70 per cent to 30 per cent according to figures collected from these series. The greater hope

of life that the elastic bag or hystereurynter gives the fœtus may be judged from Thies' (11) report of the results from Bumm's clinic. Taking all births into consideration, the fœtal mortality was as follows: spontaneous delivery, 20 per cent; vaginal gauze plugging, 33 per cent; combined version with slow extraction, 80 per cent; combined version with rapid extraction, 64 per cent; vaginal Cæsarean section, 50 per cent; hystereurynter or elastic bag, 14 per cent.

Combined version with delayed extraction is very fatal to the child and should be restricted as much as possible to urgent cases where the mother's condition demands immediate control of the hæmorrhage. If the interest of the mother alone is to be considered, Braxton-Hicks' version and delayed extraction remain the safest method if the cervix is partially dilated.

ELASTIC BAG TREATMENT

There are certain necessities for successful treatment by the hystereurynter. The bag must be of large size, as big as a normally large fœtal head. It should measure 10 to 12 cm. in diameter and contain from 500 to 600 cm. (about 20 oz.). The bag treatment in this country has achieved a bad reputation because the small de Ribes bag, intended for induction of labor, has been used and inserted outside the ovum.

The bag should be inserted within the membranes with a special forceps for the purpose, and with antiseptic precautions. The bag may be boiled and kept ready for use in glycerine which will preserve it, as rubber is apt to crack and spoil if kept dry. It may be boiled with the glycerine in a large preserve jar and the jar wrapped in a sterile towel ready for use.

The bag remains in position for 3 to 5 hours as a rule. If the control of the hæmorrhage is good, no weight need be attached; but, if the bleeding is not perfectly stopped, a 2 lb. weight may be attached on a cord running over a pulley, as in fracture extension, on the end of the bed. If the weight is attached, a stout elastic band should intervene between the bag and the cord of the weight. In this way, sudden pull on the uterus, caused by the patient drawing away from the weight, is avoided and the danger of cervical laceration is lessened. The weight should only be attached to those cases where there is considerable hæmorrhage or labor is unduly prolonged. After the use of dilating bags, the operator should be necessarily cautious in doing version and breech extraction, as there is danger of uterine rupture.

The advantage of the bag is that compression is applied directly to the placenta forcing it back into its place. Tamponage on the contrary forces the placenta away from its bed and tends to increase hæmorrhage. The bag acts as a tampon, as a labor promoting element, and as a gentle dilating force.

PACKING THE CERVIX WITH GAUZE

Cervical tamponage is a makeshift method, only to be resorted to when the bags are not at hand. It is often ineffectual in controlling hæmorrhage and of little use as a cervical dilator. The percentage of infection after packing is larger than after any other method. It is useful when the cervix is partially dilated and hæmorrhage must be controlled until other measures are undertaken.

Antiseptic moist gauze should be used and it is well if the antiseptic is a styptic also. Izal 1–200 is a useful antiseptic styptic solution in which to dip the gauze. If iodoform gauze is used, it is best to make up the iodoform emulsion according to the following formula, because iodoform itself is not an antiseptic and cannot be sterilized by heat without decomposition. To 100 cc. of glycerine add one gram each of iodine and potassium iodide. Force the iodine into solution by heating in the Arnold sterilizer. After the sterilizer has boiled for some time, allow the solution to cool and add 10 g. powdered iodoform by grinding in a sterile mortar. In this way, a sterile iodoform emulsion is obtained in which the plain sterile gauze may be dipped. This formula is offered for those advocates of iodoform who think its virtues outweigh its poisonous qualities. Its virtue lies in the iodine content which is not great and izal is 9 times more powerful an antiseptic than iodine in equal strength and non-toxic, according to Klein's investigations.

The gauze may be left until the cervix is sufficiently softened and dilated to allow a bag to be inserted or bimanual version to be done.

The packing is not effective unless the gauze is packed well within the cervix and up against the placenta and the vagina packed full of gauze also in order to afford support and counter pressure. The gauze should be moist as it then may be packed more firmly and care should be taken not to bruise the vaginal mucosa in the manipulation. A vaginal speculum should be introduced with the patient upon a table and in a good light, the cervix should be caught and steadied with a bullet forceps and the gauze packed firmly. The patient should be put to bed and watched carefully for evident bleeding or signs of concealed hæmorrhage.

Maison, in a report of 154 cases treated by various methods, had the highest mortality, 25 per cent, with tamponage and lost 70 per cent of the children. The deaths were from bleeding and infection.

OTHER METHODS OF TREATMENT

The results of other methods do not show as good results as the ones referred to. Bonnaire's method of bimanual dilatation of the cervix and immediate delivery has a higher mortality than the previous methods. He has reported 171 cases treated by this method with a mortality of 18 per cent. The disadvantages of the method are the amount of time required to dilate the cervix, twenty minutes to one hour in Bonnaire's hands, with constant loss of blood, the danger of laceration of the cervix, and the difficulty of completely dilating the cervix so that the head may come through without traumatism.

STEEL DILATORS

Steel dilators after the type of Bossi's instrument are very dangerous and only of use to dilate the cervix sufficiently to allow version to be done or to insert a bag. A de Ribes bag may usually be inserted through a cervix admitting two fingers, and to obtain this amount of dilatation the Goodell two pronged dilator does as well as the more complicated and expensive instrument of Bossi.

CÆSAREAN SECTION

Cæsarean section, much vaunted of recent years by surgeons, is not favored by obstetricians. Holmes' collection of Cæsarean sections for placenta prævia gave a maternal mortality of 20 per cent and an ultimate fœtal mortality of 64 per cent. Little encouragement here to advocate the operation. Jewett, in a later paper, collected 95 cases, not including Holmes' collection, with a maternal mortality of 11.5 per cent and a direct fœtal mortality of 34 per cent, the ultimate fœtal mortality of children dying in the puerperium not being stated. The combined series give a maternal mortality in 125 cases of 13.6 per cent.

The ease with which Cæsarean section can be done deludes operators into the belief that it is a simple operation and without mortality; but the facts remain that the mortality of all classes of Cæsarean section is, in 1,282 collected cases, 8 per cent and, of clean cases with membranes intact, done under the most favorable auspices, 2.9 per cent. How much greater will the dangers be in placenta prævia where the patient, weakened by hæmorrhage and contaminated by examinations, is unfit to stand such a radical surgical procedure. These factors substantiate Shauta's opinion that to treat these cases by Cæsarean section is but to add another greater danger to that already existing.

The only excuse for a Cæsarean section in any condition is to save a living child and, if there is a direct fœtal mortality of at least 34 per cent with a probable ultimate mortality one-fourth greater, a living child will hardly be obtained in as many cases as in the bag treatment and the safe method of version and delayed extraction will save more mothers. It is doubtful whether the 125 cases with 13.6 per cent mortality represents the true estimate of mortality, as no large clinic statistics have yet been reported and, with isolated cases, it is human nature to report successes and allow failures to be forgotten.

When Cæsarean section is not done until the end of the period of dilatation, there is no security against a fatal after hæmorrhage, for, by that time, the insertion of the placenta in the isthmus or cervix has already been

stretched and, with defective contraction of this segment of the uterus, hæmorrhage is likely to follow. The hæmorrhage comes mainly from the lacerated vessels in the upper part of the cervix and, with a Cæsarean wound in the uterus, this would be difficult to control by gauze packing or other means.

VAGINAL CÆSAREAN SECTION

This operation has been advocated in placenta prævia with an undilated cervix. Bumm was its most weighty advocate; but now he, Sigwart (69) says, has abandoned the operation. The amount of hæmorrhage is greater from a cut wound than from a torn one and, in these incisions of vaginal Cæsarean operation, the bleeding is sometimes severe and difficult to control. If the placenta is situated posteriorly, it may be possible that anterior hysterotomy may be of value, but it is difficult to decide when this condition occurs. Also, if the placenta is posteriorly situated, the elastic bag may be passed around the anterior lobe.

Incisions into the cervix, when the os is not fully dilated, are, however, occasionally of use, although they need not go so far as to include the surface of the uterus above the vaginal vaults.

TREATMENT OF INCOMPLETE PLACENTA PRÆVIA

In the treatment of the incomplete form, the mainstay of treatment is the elastic bag. Its advantages are that it can be easily inserted and it controls the hæmorrhage. The placenta, not covering the os completely, does not obstruct its passage; the membranes are easily ruptured and the elastic bag may be inserted within the membrane, much reducing the mortality.

Version and breech extraction must be reserved for those cases of incomplete placenta prævia in which the os is fully dilated with unruptured membranes or urgency of delivery is demanded. The greater possibility of obtaining a living child in incomplete placenta prævia renders it expedient that all possible means should be taken to this end.

When the insertion of placenta is high in the uterus and the membranes present at the os, the hæmorrhage may sometimes be controlled and labor hastened by rupture of the membranes. This gives the best chance of a live child.

The treatment by rupture of the membranes alone, however, should be confined to mild cases with a high insertion of the placenta. The main reliance in the treatment of incomplete placenta prævia should be the large elastic bag, 10 to 12 cm. in diameter and with a capacity of 500 cc. of water. Version and breech extraction should be reserved for those urgent cases with a fully dilated cervix and much bleeding.

ADHERENT PLACENTA

After delivery of the child, the placenta is quite often adherent and does not readily come away. The condition of the patient is usually such that time cannot be taken to allow of the placenta separating spontaneously, but it is better to remove it manually, if necessary. The placenta is adherent, according to the combined statistics before referred to, in a greater or less degree, in 42 per cent of cases.

POSTPARTUM HÆMORRHAGE

The dangers of placenta prævia by no means cease with delivery of the child, but in a large proportion of cases, hæmorrhage occurs after labor. This bleeding does not as a rule occur immediately after delivery, because of the fall in blood pressure coincident with the birth of the child; but usually takes place within an hour. This delay of the hæmorrhage makes it of a most insidious and dangerous character. A very large percentage of all deaths in placenta prævia are due to this form of hæmorrhage. In Hammer's (14) series, 3 of 8 deaths were from postpartum hæmorrhage due to atony of the uterus. In Warren's (3) series of 94 cases, postpartum hæmorrhage was present in 15 per cent and, of 6 deaths in all, 2 were from this cause.

It is, therefore, necessary to take measures to prevent the occurrence of this hæmorrhage. A dose of one of the good preparations of ergot should be given hypodermatically immediately after delivery of the child. It is better to use one of the physiologically tested preparations, for much of the ergot upon the

market is inert. Pituitrin, an extract of the pituitary body, is very efficient in stimulating the uterus to contract and has been used with good success by Foges and Hofstatter (70) in 65 cases of postpartum hæmorrhage. It is given by deep injection into the gluteal region in a dose of 2 cc. in 20 cc. of salt solution. The uterus contracts firmly and remains in that condition for some time. It promises to be useful in placenta prævia.

The question of uterine packing with antiseptic gauze to prevent hæmorrhage immediately after delivery is an important one. If a patient is in a hospital where she can be carefully and minutely watched, and if the uterus has contracted well, uterine packing may not be necessary; but if the woman is delivered in a house where the preparation for packing would involve some delay, or if the woman is weak from bleeding and can spare no more blood, uterine packing should be done as a prophylactic against hæmorrhage. The gauze may be wet with izal 1–300 or those who prefer may use iodoform gauze. It may be removed in 24 hours.

In other words, the uterus should be packed with gauze to prevent hæmorrhage, or preparations should be made so it can be done; instantly in case hæmorrhage should begin. After delivery in placenta prævia, no patient should be left without constant medical supervision for several hours after delivery.

LATE DANGERS

The traumatism done to the uterus in delivery in placenta prævia and the alteration in the cervix from the implantation seem to have their effects upon the later health of the patient.

Radtke (71) in a study of the after life of 80 placenta prævia patients found that 50 became pregnant and, of these, 23 aborted in the subsequent pregnancy. There was sterility following in 30 per cent and 57 per cent suffered from various ailments associated with weakness, malaise, and anemia. The results are significant of the injury caused by the condition and make it the duty of the physician to keep these cases under observation and combat any disturbance by appropriate measures.

CONCLUSIONS

Of 8,625 cases of placenta prævia treated in the antiseptic era, the mortality of the mothers was 7.22 per cent and the mortality of the children was 55.5 per cent. The mortality of the children is underrated because of lack of uniformity in reporting.

The maternal mortality of complete placenta prævia was 15.5 per cent and fœtal mortality 71.9 per cent; the maternal mortality of incomplete placenta prævia was 4.8 per cent and the fœtal mortality 58.9 per cent.

Incomplete placenta prævia is two and a half times more common than the complete form.

Complete placenta prævia (*placenta prævia totalis*) is a different disease from incomplete placenta prævia (*placenta prævia isthmica aut simplex*) with a different incidence, a different pathologic anatomy, a mortality three times greater, and requires different treatment.

In placenta prævia, *immediate treatment* gives the best results to mother and child; but immediate delivery is not always advisable.

In complete placenta prævia, if the cervix is fully dilated, combined (bimanual) version of Braxton-Hicks should be done. Extraction should not follow version unless the os uteri is completely dilated, because of the danger of cervical laceration, hæmorrhage, and uterine rupture.

If the child is dead or premature and the cervix not fully dilated, combined version with extraction of the child, delayed until the os dilates, will arrest hæmorrhage and save the mother. This expectancy is dangerous to a living child.

If the child is not known to be dead and the cervix is undilated, the best results for mother and child are obtained by the water dilated elastic bag of Champetier de Ribes, introduced by a special forceps within the uterus and within the ovum. The bag should be 10 to 12 cm. in diameter, with a capacity of 500 to 600 cc. and may be kept without deterioration in glycerine. The bag controls hæmorrhage by means of direct pressure, acts as a gentle dilating force, and, in placenta prævia in general, is the most successful mode of treatment. The cervix may be dilated with

Goodell's steel dilator to a size sufficient to admit the bag, if the os is resistant.

If the cervix is not dilated and the patient's condition is grave, the best results for the mother are obtained by combined version and delayed extraction. This usually sacrifices the child, but 71.9 per cent of the children die in any case and, of those babies saved, 15 to 40 per cent die in the puerperium.

Incomplete placenta prævia in general is best treated by the elastic bag, introduced within membranes. If the cervix is fully dilated, combined version and extraction may be done. Rupture of the membranes suffices for mild cases.

Postpartum hæmorrhage occurs in approximately 12 per cent of all cases of placenta prævia and is a frequent cause of death. This should be guarded against by appropriate measures.

Gauze tamponage of the cervix is not a good method of treatment of placenta prævia, as it exposes the woman to infection, separates the placenta, and often does not control the hæmorrhage. It is a makeshift method to be used only in emergency. The elastic bag should be given the preference.

From the time of diagnosis of the condition until some hours after delivery, the patient should not be left without medical care. This is particularly true of the first hours after delivery when the danger of delayed postpartum hæmorrhage is great.

Cæsarean section kills more mothers and saves a few more weak babies. It adds to the dangers of placenta prævia the risk of Cæsarean section in an anemic patient and does not, unless hysterectomy is done, remove the possibility of postpartum hæmorrhage.

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PERITONITIS[1]

IN THE SERVICE OF DR. JOSEPH PRICE

BY J. W. KENNEDY, M. D., PHILADELPHIA, PENNSYLVANIA

NUMEROUS requests from members of the general profession and specialists, that I write something about the work and views of Dr. Price in regard to intra-abdominal pus, has suggested the title of this paper.

During the last two years a wave of conservatism has dominated the American profession in the operative treatment of acute infectious lesions of the abdomen. In suspected and suggestive proportion have these requests for the views of this most radical operator in these acute suppurative conditions, become more numerous. Surgically incomplete work will as often give you damnation as a heritage, as any unfinished procedure will in the commercial world.

That brilliant convalescence, the seeming resurrection which so often follows the early and complete removal of an acute infectious lesion of the abdomen, ever forbids incomplete work with its companions of prolonged convalescence, multiple operations, bowel obstructions, metastatic conditions, fistula, etc.

There seems to be a selfish yet an admirable pride which endows the viscera of the abdominal cavity and welcomes the surgically masterful hand, yet is so rebellious to meddlesome work. No speakable conscience could be more clearly depicted, than is seen in the aversion betokened by unphysiological and unanatomical work upon the abdominal viscera.

No operator has done so much to put pus forming lesions or urgent abdominal conditions on a substantial surgical basis, as Dr. Price. His work in pus lesions is a Gibraltar and is established upon surgical principles just as impervious to attack as this famous fortress.

Over a quarter of a century ago, working in the slums of Philadelphia, he had completed one hundred sections for pus tubes with one death, which was the greatest record of the age, or any age, and was the first one hundred pus sections with radical removal of the pathology, in America.

When you are familiar with the filth and squalor of the slums, I consider this the greatest exhibition of any age and far superior to the pus work which is being done in many of the modern hospitals. Could this operator, being the surgical wizard that he is, have made any such record had not his principles of radical removal of pathological lesions been one hundred per cent right? Could he at the dawn of antiseptic surgery have gone from house to house, among these half starved creatures, immersed in filth and have gotten such a phenomenal mortality, had he done incomplete or puncture surgery?

Any one who has had an experience in "from house to house surgery," is familiar with the fact, that he cannot do anticipatory surgery expecting to return to do his second or third operation, without being swamped by the complications of his incomplete work.

You cannot leave the patient in the hands of others unless your surgery is one hundred per cent good primarily, and then the cook can take charge. Let us try and put more of them in the cook's hands.

Many good operators have given up foreign work because the mortality was much higher than in their own clinic. A slight difference in mortality may be anticipated but should not be prohibitive to outside work.

Dr. Price at a great personal sacrifice has gone from state to state, from clinic to clinic, to give object lessons in pus lesions of the abdomen. His usefulness in this work would have been early precluded by a high mortality had not his work been established upon keen cut removal of pathological lesions, followed by his complete toilets. To have been his assistant and surgical associate is to endorse every principle of his work.

[1] Read in Scranton, Pennsylvania, before the Lackawanna County Medical Society, March 7, 1911.

This era of so-called conservatism in infectious lesions of the abdomen, has made his private hospital a refuge for surgically crippled patients.

The operator who cannot primarily complete his work in suppurative conditions, has little or no chance to remove the lesion in a secondary attempt. Puncture surgery is only a poker to the fire.

I have never been able to stimulate myself to the extent that I felt master of a secondary operation and only a fortune teller could have the temerity to prophesy the extent of the complications which may confront you. Surgically cripple a patient and only the gods can cure him.

I make this assertion as an earnest plea for early and complete primary work.

To be familiar with Dr. Price's complete primary work and also the complications which follow the incomplete pus work of others, is to command his choice of procedure.

Nearly thirty years ago Dr. Price forcibly called the attention of the profession to the direct cause and effect of gonorrhœa in the male and pyosalpinx in the female. At this date his discussions were welcomed by few and condemned by many. Some of his most ardent disputants threatened him with striped clothes, shaven head, and closed bars, but a small thing like this has never dampened the ardor of surgical progress, when carried upon the broad shoulders of pathological truths.

There is at present a positive reversion to primitive methods in the treatment of most of the active pus forming lesions of the abdomen. Is it because the privileges of the aseptic era of surgery have permitted too many men without apprenticeship to indulge themselves in this work, or has this most important work been neglected for the cleaner lesions of the upper abdomen?

It is a fact that the profession is well united on when and how the surgery shall be done above the umbilicus, but when we begin to discuss pus or peritonitis, there is no peace.

Just as our technique has become more complicated, and fanciful instruments have been substituted for the intelligent fingers, in due proportion has the pus work grown more incomplete and last of all comes the gloved hand to sound the knell of finished surgery. They have armored the hand and thus thrice stimulated the foe, with the result that adhesions are looked upon as a sacred wall surrounding a conquered foe.

The operator who is not schooling himself to deal with adhesions, should never open the abdomen below the umbilicus.

The more I see of pus work, the more I am impressed with the fact that it cannot be done with instruments at the command of vision. It must be done from sense of touch by intelligent fingers.

The Trendelenburg position in pyosalpinx has had much to do with the failure of operators to remove the pathological condition.

I have had an opportunity to witness such an attempt a number of times and nothing has so impressed me as the helplessness of men attempting to do this work with scissors and forceps.

No work ever done is more impressive than the finished enucleation of tubo-ovarian abscess as done by Dr. Price through sense of touch, with the patient in a horizontal position; and he is prone to say "You had better tie a handkerchief around your eyes, if you want to do good work in the pus laden pelvis." After seeing his work, it seems to me that it would take the complacency of conscience of a Pennsylvania politician to puncture a vaginal vault for tubo-ovarian abscess.

We were in hopes that the thorough dissections being done in malignant conditions would stimulate more complete work in other lesions. It remains to be seen whether the discussions and contributions of the last year, on malignancy of the appendix, will induce the profession to remove that organ in its entirety and stop asking us to read lengthy papers on how to treat the stump of the appendix. The very word "stump" of any pathological organ should be a sufficient plea for its removal. Why have we the right to consider the proximal end of the organ any more healthy than the distal? There is no patient so hard to get surgically right as the one who has been nerve racked by the incomplete removal of the appendix.

You may remove the stump and break the

adhesions incident to that chronic source of irritation and yet in a good number of cases the patient is an invalid for a long time. It is just another beautiful demonstration of the fact that the pathology of the surgically crippled patient is less amenable to treatment than the pathological condition of the patient's own manufacture.

The point I want to make is, that you cannot enter the abdomen and half do anything and get out with surgical grace. Nature seems to demand one hundred per cent good, and revolts at surgical timidity and its resultant incomplete work. It is the scars of incomplete pus work in the lower abdomen which have driven many operators to cleaner upstairs work.

The oncoming generation of surgeons will be taught the importance of the preservation of inflammatory walls in acute infectious lesions.

They will be robbed of that schooling which is so necessary in dealing with adhesions between abdominal viscera. Their surgical scope cannot help but grow more limited, which will preclude a great field of usefulness in abdominal work. Already our text-books limit our surgery in tubercular peritonitis to the miliary and serous varieties and teach that the plastic or adhesive variety with universal adhesions are not amenable to surgery.

No more erroneous teaching has ever been generously endorsed by the profession. Dr. Price is imperative in his teaching that these universal adhesions should be broken up, exposing both sides of the mesentery, followed by the free use of iodoform. I know of no condition in the abdomen where complete work is so uniformly rewarded.

We have many times seen great clumps of agglutinated intestine delivered through the abdominal incision, followed by the most complete breaking of all adhesions. These skeleton patients are dying from starvation and partial bowel obstruction. A large per cent of the intestine is out of commission. Indeed it is the plastic variety of tubercular peritonitis where complete surgery is most strongly indicated.

The test of the pudding is the eating of the same. I have seen these lamentable patients resurrected in great numbers and sent back to their vocations. Many of these patients die from bowel obstruction, and recently we operated upon a patient who had all the symptoms of a pyloric obstruction. We found a general plastic tubercular peritonitis with a partial obstruction of the duodenum from a kink due to adhesions to the gall-bladder. Her condition was of particular interest on account of the great numbers of healed ulcers, probably a hundred. The ulcers were glued to a proximal section of intestine and it seemed that certain ulcers had perforated, thus short circuiting the bowel canal. It is surprising the amount of iodoform these patients will stand. Many times the lethal dose can with safety be dusted over the viscera as you break the adhesions. The tubercular patient certainly has some immunity to the toxic effects of iodoform or there is very little absorption takes place in the presence of tubercular peritonitis.

It is my belief that peritoneal absorption is much minimized in the presence of any variety of general peritonitis.

In a former publication I have taken the ground that in the presence of a general peritonitis of septic origin in which you have more or less distension, you cannot afford to ignore the absorption from the mucous surface of an obstructed or partially obstructed bowel which is incident to peritonitis.

This is one of the strongest reasons which prevents us accepting the physiological era of treating septic conditions of the abdomen. We cannot look upon the distended abdomen incident to a diffuse or general peritonitis as a mere symptom but must view it as a surgical condition of partial or complete bowel obstruction. Therefore we have two vast planes from which septic absorption is taking place, one endothelial and the other mucous; and it is my belief that after the peritoneum is generally involved in presence of distension, more absorption of toxins takes place from inside the bowel than from the visceral or parietal peritoneum. This is a very positive indication for the completed toilets of the pathological surgeon which means the release of all obstructions and removing the distal source of infection.

You may say that in some of our most vicious and rapidly fatal forms of intra-abdominal infections, there is no distension of the abdomen and the patient dies with a soluble bowel. I doubt whether you can truly call this fatal form of infection a peritonitis. It is early a retroperitoneal infection or lymphangitis and is a nightmare to the surgeon. I have seen two deaths from this variety of infection in less than twenty hours after the first symptom, and Douglas reports a death from appendicitis in twelve hours after the first pain. This was probably a perforated retrocecal appendix and followed by the rapidly fatal lymphangitis. There is no appendix so important to early removal as the one in retrocecal position, and this is the anatomical position of the organ which must be most often neglected by those who are not advocating its uniform removal. If the radical toilets of Dr. Price, in dealing with diffuse peritonitis, are to be called criminal in their severity, before sentence is to be passed by the physiological surgeon, he must assure us of a number of points in comparing results. If he reports a condition as diffuse peritonitis from a neglected appendicitis, did he really operate for diffuse or general peritonitis, or was it what we might term a local condition? We shall have to excuse him from this embarrassing question because his surgery has not been sufficiently thorough to determine whether the involvement of peritoneum is diffuse or general. Again still further, if his surgery consisted in the mere drainage of an abscess of the ileocecal region, was it really due to the appendix? Is it not possible that he may have drained a pyosalpinx or even the perforated gall-bladder? To remain surgically ignorant of what you have really done must give one a feeling of insecurity and profound apprehension. If he drains the right iliac fossa for a suppurating or perforated appendix and has made no effort to remove or even locate the organ, should he expect a drain inserted between the cecum and parietes to drain a perforated retrocecal appendix or the organ in the iliocecal fossa? Even if the operator has supplemented his drainage of the iliac fossa by a drain to a dependent point of the pelvis, he has not yet established a continuity between his drain and infected area to be drained.

The operator certainly cannot afford to ignore his anatomical knowledge of the possible location of the organ.

We have been severely criticized as being too sanguine in our expectancy in regard to the virtue of the extensive cofferdam drain, but we have never had sufficient optimism in the cofferdam to expect it to drain a perforated or suppurating organ which we had not even located. To simply drain the iliac fossa for a suppurating appendix is just as much a "dismal swamp" operation (Price) as the puncture of the vaginal vault for pyosalpinx.

There has been no greater mistake in the surgery of suppurating lesions and peritonitis than the discarding of the extensive gauze drain and the substitution of tubal drainage.

In suppurating conditions where extensive areas are involved, tubal drainage is not sufficient in scope of area drained, and predisposes to intestinal obstruction. Gauze is not only more prolific in its drainage but it has a most valuable mechanical advantage. For instance, take the filthy right iliac fossa, or the suppurating pelvis with a diffuse peritonitis; remove the pathological lesions and then place a solid cofferdam posterior to the broad ligament, extending around to head of the cecum. You have not only extensively drained the most infected area by mechanically elevating and preventing the intestine from prolapsing into the pelvis and coming in contact with the filthy areas, but further, a large area of the peritonitic intestine is not only drained by coming in contact with the cofferdam but is better drained on account of its elevated position. Again the cofferdam prevents the prolapse of the half paralyzed intestine into the pelvis, which is so often followed by postoperative obstruction. Dr. Price's work is a strong demonstration of these points, as postoperative intestinal obstruction is practically not seen. As operators have grown less thorough in their toilets, they have had to abandon the extensive gauze drain for tubal drainage. It would be impossible to insert a good cofferdam unless the pathological lesions had been removed and all adhesions broken. This should be sufficient

plea for its use. If our means of drainage must be modified or regulated by the frailty of our surgery, God pity the patient. Why be so merciless in our surgery? Why go on with the cart before the horse? Asepsis has brought us face to face with the prophylactic era, and there should be no peritonitis. Prophylacsis (that guard which stands before), I would substitute this term for the so-called physiological era in surgery. I have never seen a diffuse or a general peritonitis, the birthplace of which could not have been recognized, and should have been determined early as a local lesion.

It is true that the acute toxæmias or retroperitoneal infections may be fatal ere the true source has been recognized, but it is just as true that our surgery would have to be prophylactic to save these victims. Why go on vying with each other as to the proper method of dealing with a lesion which is born from neglect? The missing link is early diagnosis. When shall we operate? If peritonitis we must have, when and how shall we treat it? Operate the first hour at any stage and make your toilets proportionate to the extent of the peritonitis, always removing the offender. If the profession will unite on this point, we will not long be operating for peritonitis. If the specialist operates the first moment he sees the patient in any stage of peritonitis, making a strong plea in every case for earlier work, the tardy members of the profession cannot help but be stimulated by such plea.

Is it not clear if such a plea was made to the delinquent member of our profession, that his cases of general peritonitis would gradually become diffuse, then local, and at last the lesion per se would be reached and we would have appendicitis or pyosalpinx? The greatest barrier I see to early work is the specialist who refuses to operate to-day, would have operated yesterday, and promises to operate to-morrow if patient is better. This is the operator who must be brought under the hammer. This is the specialist who is doing much to prevent early work and is responsible for the next general peritonitis in his community. There is no to-morrow in peritonitis. No operator has the right to view a diffuse peritonitis as a condition of lethargic habits. If the complacent operator continues to pick his cases, waiting for that supposed and expected quiescent stage, I trust the general practitioner will make him sign the death certificates of those poor souls whose heritage has been the fatal waiting list.

There should be no speculation in surgery, for indeed we are in possession of positive knowledge and should not be precluded from the early execution of our surgical privileges by tardy members of the profession. We have all seen subsidence of symptoms in acute infectious conditions of the abdomen, but who can predict the morrow from what he sees to-day.

Expectancy is not a legitimate property in the surgery of any peritonitis. The expectant operator who makes an attempt to classify as to the extent of acute infectious conditions, or predicts a safer hour to operate than the present, must have more substantial grounds than he has advanced so far, or he must be placed among the class of unthinking presumptives.

Peritonitis is an illegitimate offspring, and the tardy member of the profession is its father. I dislike discourtesies in literature but at the hour of this writing I have lost a valuable life from the typical retrocecal appendix, and if I gave five pounds of my flesh, I am entitled to some righteous indignation. When the history, symptomatology, and pathology of the appendix in the retrocecal position is properly written up, those operators who are attempting to classify as to time to operate, based upon the extent of a peritonitis, will find that every prop upon which they lean will be severed.

Can they say that general tenderness and distension means general peritonitis? Not so.

A very local involvement of the peritoneum in the ileocecal region will give marked distension and general tenderness. Can they say that a flat abdomen with soluble bowel and little tenderness indicates improvement and expected recovery? Again, not so.

A perforated appendix in the retrocecal space will have a flat abdomen, little tenderness, and soluble bowel, and yet the patient is dying from a vicious toxæmia from the perforation in the retrocecal or retroperitoneal

space. The retrocecal appendix will surgically murder the tardy operator and the sooner the expectant operator learns the potential danger of the organ in this location, the earlier will he conceive the fallacy of his position.

You may operate on one hundred patients with the pus running over the crest of the ileum and they will probably all get well with proper toilet and drainage, but if you operate on one hundred with the appendix in the retrocecal space, your mortality will be appalling, even where there has been no pus or evidence of peritonitis.

It is not the province of this paper to take up the symptomatology of the deep variety of appendicitis. Will but say that the accelerated pulse is out of all proportion to other symptoms and is a marked evidence of the vicious and fatal toxæmia and not a peritonitis. Many of these patients are evidently treated for typhoid fever, as we have had a good number who have been treated for such condition. The appendix certainly has an intimate relation to the etiology of typhoid fever.

It is easy to see how these patients could be mistaken for a typhoid condition. If the perforation takes place at the distal end of the organ (and it is generally the distal end that perforates) the toxins are poured out into the retroperitoneal space, rich in absorbents and without the protective lymph of the peritoneum, a fatal termination is apparent. Inconsistencies in surgical judgment and procedures demand more sound thinking.

With an increased primary mortality we search for the distal gland when operating for malignancy, yet the stump of every appendix is left for its heritage of entitled pathology. The rubber gloves have been donned for aseptic precautions, yet accumulations of pus, partial and complete bowel obstructions are left to the discretion of nature.

Puncture surgery from above and below with pathology remaining, is the popular surgery of the hour, and yet we are daily asked why so many patients are being sent home with fistulous openings and returned for second and third operations.

For years Dr. Price has called attention to the necessity and urgency of exposing the first foot of the ileum from the cecum, as it is especially predisposed to adhesions, fixations, complete or partial bowel obstructions. We are pleased to see Mr. Lane is recently calling attention to this part of the ileum. I am at a loss to know how the physiological surgeon can get through or over the top of the inflammatory Chinese wall, take care of Mr. Lane's link, and still have the proper respect for the integrity of this so-called protective wall.

There is no surgeon who has less to apologize for in his great scope of surgical judgment, and there is no one to whom the profession is so much indebted for his unselfish and consistent efforts to place acute and infectious conditions of the abdomen on a uniformly early surgical basis, as Dr. Joseph Price. When the true history of abdominal surgery is written, his name will be placed upon a pedestal which none can reach who are traveling the road by incomplete surgical procedures.

PYLORIC STENOSIS IN INFANCY

With a Study of Eleven Cases Personally Operated Upon

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PYLORIC stenosis in infancy has assumed a position of first importance in the diseases of the first weeks of infant life. Its relative frequency is indicated in the reports from the larger pediatric clinics. Dr. F. X. Walls, in a dispensary clinic of over five thousand patients annually, in addition to foundling hospital and private practice, has seen less than five cases of acute appendicitis in the last five years; in the same time he has had an experience of thirty cases of pyloric stenosis. Clinicians, both here and abroad, are reporting long series of cases. It is evident that the abundant literature on the subject that has developed in the last ten years is resulting in the recognition of the disease as a widely distributed condition.

First, as to the use of terms: In the absence of a clear understanding of the underlying pathology, the nomenclature has been inexact. There is a rather general consensus of opinion that there are two types of cases — one characterized by a spasmodic action of the normal or slightly hypertrophied pyloric musculature; the other characterized by an hypertrophy of the circular muscle of the pylorus, which enlarges to such an extent as to produce a tumor mass which effectually blocks the pyloric lumen, causing a mechanical obstruction. The term "congenital" is used as descriptive by some, and its aptness denied by others.

We shall here use the term "pyloric stenosis in infancy," in a general sense, to include all cases; the terms "spasm" and "hypertrophy" in the sense above made clear.

Clinically, the picture of the disease is that of an obstruction, complete or incomplete. The symptoms begin during the first weeks of the infant's life, usually in the second, third, or fourth; in some cases regurgitation of small amounts begins immediately after birth, possibly to remain slight and unnoticed until severe symptoms are ushered in after a week or two. The first symptoms may not appear until late in the second month.

The first symptoms to attract attention are the vomiting, constipation, and loss of weight. The vomiting may be excessive from the start. More usually an interval of several feedings separates the first attacks, the intervals becoming shorter, until vomiting occurs after each and every ingestion of food or water, or passes a feeding or two, to be followed by the vomiting of the accumulated amounts taken since the previous emesis. It is of a peculiar propulsive type. In one instance the mother stated that the vomitus was thrown a distance of four feet.

Pfaundler states that the stomach contents show approximately a normal degree of acidity, whereas in digestive disturbances there is usually a marked hyperacidity.

The vomiting accompanying the ordinary digestive disturbances of infants is commonly accompanied by diarrhœa, both being the expression of the reaction of the intestinal tract to the same irritant. In pyloric obstruction the vomiting is accompanied by constipation, which, in the advanced cases, reaches a degree that may properly be described as absolute. There is no spontaneous stool, enemas bringing a bile-stained mucus, containing no food elements and unaccompanied by flatus. In less complete grades only repeated enemas bring small results.

With the vomiting and constipation there are all the usual accompanying evidences of mechanical obstruction found in the adult — rapid loss of weight, profound depression, though not suggestive of the collapse of gangrene. With the diminished ingestion of fluids, the baby presents the shrunken appearance of excessive dehydration. The urine is greatly diminished, and finally almost totally suppressed. Dr. Walls has called attention to the frequency with which the brick-red deposit caused by the great concentration of the urine is found.

The loss of weight is rapid and intense. In our fatal case (case 9), the baby, at 8 weeks, had lost 32 per cent of its weight (from 8½ pounds to 5¾ pounds) in 20 days.

Case 5 lost 26 ounces in 7 days preceding operation.

Case 6 lost 36 ounces in 60 days; 8 ounces in seven days preceding operation.

Case 8 lost 52 ounces in 35 days.

Examination of the baby's abdomen reveals data which, in our series of cases, have been constant. Inspection immediately reveals a peculiar conformation of the abdomen. The upper abdomen is full, tense, and bulging and is made more prominent by a marked retraction of the hypogastric region. It is said that the normal infant's stomach cannot be outlined by palpation. We have repeatedly demonstrated, by laparotomy, that the tense, bulging mass, feeling to the fingers like a cyst, which can readily be outlined by palpation, is in truth the distended stomach, made more evident by the collapsed and empty state of the bowels. Slowly moving peristaltic waves course over the stomach from left to right. The ingestion of food or water greatly increases their size and frequency. They can readily be seen from a distance, or photographed. The accompanying photographs of some of our cases serve to emphasize the remarkable prominence of this symptom, and also the peculiar conformation of the abdomen above mentioned.

In the cases with hypertrophy, gentle palpation reveals a small, solid tumor, very freely movable, lying above and to the right of the umbilicus. Various writers have given the frequency with which the little tumor can be found as twenty-five to seventy-five per cent. We believe that proper, persistent palpation will reveal it in most cases in which it is to be found at operation. In our experience it is not present in the spasm cases. In our cases two were diagnosed as "pyloric spasm"; no tumor was palpated; none was present at operation. Nine of our cases were diagnosed as "pyloric hypertrophy." In all of the nine the tumor was felt before operation and its presence demonstrated at operation. The tumor can so definitely be palpated that its size and outline can readily be determined. There is some variation in both, but it is not great. The smallest of our tumors was approximately half an inch in length and slightly less in diameter, the length corresponding with the long axis of the pylorus. The largest was approximately three-fourths of an inch in length. In a general way they were olive shaped, the smaller ones rather spheroid.

There has been a sufficient difference in the clinical course of the two types of cases to enable us to make a differential diagnosis that has been verified in all cases operated upon.

The spasm cases have been less acute. They have intervals of improvement. In Dr. Walls' experience all cases but two ultimately yielded to non-surgical treatment. My own experience is limited to the two cases above referred to, upon which I operated. Both cases had periods of improvement. Spasm cases therefore reach a more advanced age, even where they do not respond to non-surgical treatment. Cases 1 and 10 of my series, the two spasm cases, were 6½ months and 4½ months of age, respectively, when operated upon. During the severe exacerbations the symptoms were as marked as in the hypertrophy cases. The loss of weight has been great, though not as rapid. Case 1 at 6½ months weighed 8 pounds; case 10 at 4½ months weighed 6 pounds 2 ounces. Both cases showed the peristaltic waves, case 10 very plainly. Constipation was never as complete as in our other cases. We did not feel, nor was there any question as to whether we felt, a tumor in either case. Operation revealed a pylorus that was practically normal in size in case 10; in case 1 the pylorus formed a distinct tumor, but it was soft and evidently could not have been palpated.

The postoperative history has differed in the two classes of cases. In the tumor cases vomiting has been controlled from the start. There would be some regurgitation of biliary matter and of some food during the first week or two in some cases, but practically the results were immediate. Some of the cases did not vomit even from the anæsthetic or at any time after operation. Both spasm cases showed improvement from the start; case 10 gained 11 ounces during the first fourteen

days after leaving the hospital. Case 1 gained 30 ounces in the first thirty days. Yet both cases continued to vomit more or less. In case 1 vomiting persisted for over two months; in case 10, operated upon three weeks ago, vomiting still continues. That they gain rapidly in spite of the vomiting is due to the patency of the new stoma. The stools immediately become better, and the child evidently absorbs liquids from the start. It has seemed to me that the following is the explanation for the persistence of vomiting: In all my operations I have made a typical posterior gastro-jejunostomy, making the anastomotic opening as near the pylorus as I conveniently could. It seems to me probable that the entire pyloric end of the stomach participates in the spasm to such an extent as to keep the stomach contents from freely reaching the new opening. The pyloric end of the stomach is kept practically empty even with the fundus full. It is my intention to make my anastomosis in future spasm cases well back from the pyloric end, as is commonly done in the adult. If my theory of the nature of the postoperative vomiting in these cases is correct, we should be able to control it in this way.

Pathology. It is universally agreed that the tumefaction consists of an hypertrophy of the circular muscle fibers of the pylorus. The longitudinal fibers are either not at all involved, or to but a slight extent. The mucosa is normal. The narrowing of the lumen renders it relatively redundant, so that it lies in longitudinal folds. The spasm cases show but a slight grade of hypertrophy. None of the various theories that have been brought forward to explain the findings have a basis that admits of definite demonstration, and I believe it best simply to acknowledge our lack of knowledge of the etiology at the present day. The changes other than those described are merely consecutive to the stenosis. Ulcer of the duodenum has been found, but its relation to the stenosis is absolutely unknown.

The tumefaction in the hypertrophy cases is such as to cause what early becomes a complete blocking of the pyloric canal. The physical characteristics of this tumor are such that it seems to me the obstruction must be due entirely to the mechanical action of the mass, and not to any active contraction on its part. It is upon this question that the decision as to whether or not the hypertrophy cases are surgical must be decided. The peritoneum is so tightly stretched over the tumor that divulsion always causes it to be extensively lacerated. I recognize that it would appear to be possible for the peritoneum gradually to yield to allow the muscle to relax, but the physical picture of the tumor is not suggestive of such an eventuality.

In pyloric spasm without hypertrophy there appears to be every reason to expect a large percentage of spontaneous, or at least non-operative, recoveries. Such, in fact, have been the results obtained by pediatrists. I should regard as surgical only such of these cases as have failed to react to properly balanced, persistent, non-operative treatment on the part of a skilled pediatrist.

SURGICAL TREATMENT

Three types of operation have been widely practiced: divulsion of the pylorus, pyloroplasty or one of its modifications, and gastroenterostomy.

Divulsion. Could divulsion be carried out successfully, it would be the simplest and most rational of all operative methods. It has been widely practiced because of its simplicity, but without uniform results. Still alone seems to have had satisfactory results. He reported nine operations with one death. On the whole, the mortality has approximated that of the more extensive operations. Several factors must be taken into account in considering the advisability of divulsion. In the cases with hypertrophy, the peritoneum is almost necessarily extensively lacerated. The degree of stretching of the muscle must always be a question of judgment in the individual case. There cannot be the mechanical nicety of technique that is so satisfactory in a typical intestinal anastomosis. Overstretching might mean rupture through into the peritoneal cavity; insufficient stretching would result in immediate or early relapse. Divulsion would be simpler and more easily carried out in the cases with spasm. If the spasm is limited to the pylorus proper, the

mechanical results should be everything that could be desired. Two questions, however, must be settled before definitely deciding in favor of its advisability: First, does the entire pyloric end of the stomach participate in the spasm? If so, divulsion of the pylorus alone would be insufficient. Second, is the passage of stomach contents through a pathologic pyloric region the cause of the spasm? If it is, it would be more logical to divert its course, as we do in ulcer cases in the adult. The high mortality of divulsion may be due to preventable factors, and I am not certain of the validity of the objections that I have brought against it. I have had no personal experience in its use, but I regard it as not irrational. I should add a feature to the technique which was suggested to me by Dr. Walls, and which I shall describe in the discussion of gastro-enterostomy.

Pyloroplasty. Superficially pyloroplasty appeals to us as placing the parts in a nearly physiological condition. Especially has it seemed important to cause the stomach contents to pass through the duodenum, since the importance of the duodenal secretion has been recognized. I shall discuss this element later. Technically, pyloroplasty, whether the original Heinecke-Mikulicz or one of its modifications, is a more difficult operation to perform than gastro-enterostomy, and is likely to be accompanied by a higher death rate in the same class of cases. In the cases of stenosis with hypertrophy, the rigidity and mass of the tumor render it particularly difficult.

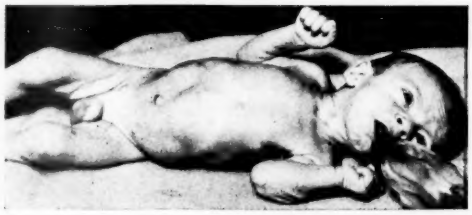
Gastro-enterostomy. Gastro-enterostomy has been the operation of choice of the great majority of operators. It relieves the obstruction at once. The technique has been highly developed. In spite of possible theoretical objections, extensive experimental and clinical studies have failed to reveal any altered metabolism due to diversion of stomach contents directly into the jejunum without the intervention of the duodenum. Persistent biliary vomiting of the earlier days of gastric surgery has disappeared with the development of modern technique. Secondary jejunal ulcer has been reported but once (Mikulicz); it followed an anterior gastro-enterostomy, an operation which should not be done to-day.

Case 3. This and the succeeding photographs illustrate the visible peristalsis seen in these cases.

The ultimate results have been exceedingly satisfactory. Numerous reports on the general physical condition subsequent to operation and studies on the effect of the operation on digestion have all been satisfactory, and in marked contrast to the prolonged digestive disturbances following non-surgical treatment, where the patient has survived, as in reports by Heubner, Koplik, and others.

REPORT OF CASES

I have operated upon eleven cases of pyloric stenosis of infants — two of the type known as spasmodic, nine of the type characterized by muscular hypertrophy. In all cases the operation was a typical posterior no-loop gastro-jejunostomy, except that in one (case 4) a rather short transverse mesocolon caused me to do an anterior colic, but posterior stomach operation. There was one operative death (case 9). Of the ten cases that survived the operation, one has since died (case 3). It was a typical hypertrophic stenosis. The obstruction was apparently complete. It vomited practically everything ingested. Its general condition was exceedingly critical at the time of operation. It made a perfect operative recovery. It did not vomit a single time after the operation, not even from the anæsthetic, during its stay in the hospital, a period of twenty days. It left the hospital during a spell of intensely hot weather to live in the crowded district immediately adjacent to the dispensary, where the usual mortality from digestive disorders among infants is exceedingly high. It was given an artificial diet in the absence of breast milk. It was re-



Case 5.

Case 7.

turned to the hospital four days later with vomiting and diarrhœa, apparently with a typical food intoxication, and died at the end of six days. Though vomiting was the most marked feature of its illness, its stools were greenish, undigested, with curds, etc. An autopsy was not permitted. I feel that this case should be regarded as having recovered from its original lesion.

The first of my cases was operated upon twenty-five months ago; the most recent, within the last few weeks. Of my first seven cases, the six that are alive are all in perfect physical condition, and either of normal or above average weight. These have all had a satisfactory degree of supervision since operation. Case 8 developed an acute intestinal obstruction five days after operation. On opening the abdomen it was found that a volvulus had formed, which included the entire small intestine from the jejunum at the site of the anastomosis to the cecum. A twist of between a half and a complete circle had formed. It was reduced and a perfect recovery ensued, the child not having vomited since. Probably, however, in part at least as the result of its lowered resistance, its ventral incision opened up about ten days later and permitted of a partial prolapse of its viscera into its dressings. These were returned, the wound again sutured, and the child's recovery was apparently uninterrupted. This child is kept under the most insanitary conditions in a basement home, and part of the time is kept in the hospital. Under the circumstances its gain in weight has been slow, but no serious alimentary tract disturbance has occurred. Cases 10 and 11 have been operated upon within three weeks; both have gained, case 10, 21 ounces in 20 days.

Case 1, operated upon twenty-five months ago, developed an intestinal obstruction seven weeks after operation. On opening the abdomen extensive adhesions were found and an angulation relieved. Since developing my operation it has seemed to me that the adhesions were due to faulty technique. Though the operation appeared to go smoothly, and was not accompanied by any gross leakage or excessive manipulation, I believe that seepage occurred from the use of suture material unsuited to the purpose, resulting in the widespread adhesions mentioned. The child recovered and has since shown no evidence of the existence of these adhesions. It is to-day a particularly hardy and ruddy child.

A study of the accompanying table will give an idea of the universal gain in weight. Seven

Case 8.

Case 9.

of the babies gained 30 or more ounces each in the first 30 days following the operation. Case 10, operated upon 24 days ago, has gained 21 ounces. The ultimate gain has also been exceptionally good. Of the earlier cases, case 1 weighed 35 pounds at 2 years and nine months; case 2, 20 pounds at 7 months; case 4, 22 pounds at 11 months; case 5, 19½ pounds at 10 months.

None of the nine babies living shows any evidence of intestinal disturbance. In every instance the stools are normal, well digested, and regular. Case 7, living under unfavorable conditions, has had some temporary bowel disturbance, which at no time has been serious. Case 3, it will be remembered, died of a bowel disturbance, under circumstances described above.

Three factors enter into the comparatively low death rate I am able to present. They are: the time of operation, the supervision of the child by a pediatrist after operation, and the technique of the operation itself.

TIME OF OPERATION

When one has to deal with an infant a few weeks old losing an ounce or more in weight daily, it is evident that delay in remedial measures must early prove fatal. Case 9 lost over 32 per cent of its weight. Such a baby is almost necessarily doomed to die, without regard to the cause of the starvation and in spite of overcoming it. Most of my cases were seen by Dr. Walls and were recognized and operation insisted upon early. We have felt that in the cases of stenosis with hypertrophy, in which the obstruction was of a high grade, no time should be given to an attempt at non-operative treatment. Most of these cases were operated upon within a few hours after first being seen. When the obstruction appeared to be less complete, a limited time was taken up in attempts to secure relief by non-operative treatment, but the attempt desisted in when the loss of weight was continued. The two cases recognized as pyloric spasm were under treatment for many weeks before operation was decided upon. On the whole, the cases with tumor are almost necessarily surgical, and delay will merely lower the child's resistance. The spasmodic cases, however, are often relieved, and a thorough trial of non-surgical measures should be made.

THE AFTER CARE

The operation relieves the mechanical cause of the trouble, but the high grade of malnutrition that is present in all but the earliest cases requires the services of the skilled pediatrist. This is especially true when, as so often occurs, the breast milk of the mother has been lost before the nature of the disturb-

Case No.	Hospital Record Number.	Sex.	Born.	Operation.	First Symptoms.	Marked Symptoms.	Weight.			
							At Birth	Maximum	At Operation	Since
1	*St Mary's Hospital	M.	8-27-08	3-17-09	Almost from start	Third week	8 lb		8 lb	28 lb at 18 mo. 35 lb at 2¾ years
2	Wesley 24,531	F.	4-10-09	5-22-09	2 weeks	Few days after beginning	8½ lb		8 lb	20 lb at 7 mo. 26½ lb at 22 mo.
3	Wesley 24,717 24,931	M.	3-3-09	6-10-09	6 weeks				8 lb, 3 oz.	
4	St. Luke's 56,252 56,557	M.	6-25-10	7-20-10	First days	14 days	7 lb, 3 oz.	7 lb, 11 oz	6 lb, 8 oz.	22 lb at 11 mo.
5	St. Luke's 56,511	F.	7-5-10	8-4-10	Vomited once each on 10th, 14th and 18th days	Vomited "everything" from 23d day until operated upon	8 lb	8½ lb	6 lb, 14 oz.	10½ lb at 10 mo.
6	St. Luke's 58,914	F.	9-24-10	12-24-10	"Spitting up" from first days	6th week	9 lb	10 lb	7 lb, 12 oz.	9 lb, 12 oz. 28 days after operation
7	Wesley 30,698	M.	11-19-10	1-27-11	3d week	Gradual development, 5th week "everything"	10 lb		7 lb	15 lb at 6 mo.
8	Wesley 31,564	M.	2-14-11	4-4-11	"Spitting up" from first days	"Everything" after 14th day	10 lb, 12 oz.	11 lb, 3 oz.	8 lb	11 lb 7 weeks after operation
9	Wesley 31,712	M.	3-14-11	4-13-11	First days	Marked early	8 lb	8 lb, 8 oz.	5 lb, 12 oz.	Died
10	Wesley 31,970	M.	12-16-10	4-28-11	From start	Excessive during first days	5 lb, 4 oz.	6 lb, 13 oz.	6 lb, 4 oz. (lost 4 oz. during next few days)	7 lb 5 oz. 24 days after operation
11	Wesley 31,993	M.	3-17-11	5-4-11	4th week	"Everything" at five weeks	7 lb	7 lb, 12 oz.	5 lb, 13 oz.	Too recent

*Green Bay, Wis.

ance has been recognized. Except in so far as the immediate shock of the operation is concerned, I have been unwilling to assume the after care of these infants, but have placed them in the hands of the pediatrists.

TECHNIQUE

Preliminary. The chest and extremities are well wrapped in cotton batting and the child fastened so as to prevent its arms and legs getting into the field of operation. I have given salt solution per rectum to add to the child's body fluids, but have usually failed to have it retained. I have not given it subcutaneously, though I should think it might be of value. I use ether anæsthesia, and try to have it complete. Evisceration caused by struggling is a serious disaster. Though the stomach is emptied before the anæsthetic is started, I have found that it tends rapidly to balloon, and I usually pass a tube (a rubber catheter) after anæsthesia is complete, or even after making my parietal incision, so as to allow of complete collapse of the stomach. This I have done since noting in my earlier cases that the stomach is always tense and drum-like.

THE OPERATION

I have been doing the typical posterior operation, without any special modification in the technique, except in the use of suture material. I have always felt that surgeons are commonly in the habit of using suture and ligature material of a much heavier kind than is necessary or desirable for the purpose. In intestinal suturing the finest kind of silk obtainable, used in the finest cambric needles, is amply strong. In experimental work I have used size "000" silk, and even human hair, and have found it perfectly satisfactory. In my gastro-enterostomies I am using size "0" or "A" silk, of the kind bought in the dry goods stores, in a size "10" cambric needle. It seemed to me that the peritoneal adhesions in my first case were caused by seepage due to the rather heavy suture material that I used, and which probably had the capillarity of a wick. In respect to capillarity, I am not at all certain that celluloid linen has any superiority over silk, and I prefer to use the latter. Before returning the stomach to the abdominal cavity, I

have carried out a suggestion of Dr. Walls to introduce fluids into the jejunum at once by passing a tube into the stomach and on through the new anastomotic opening into the jejunum; by using a funnel the child may be given a valuable dose of water at once. The same maneuver may be carried out in doing a divulsion of the pylorus, the catheter being passed through the stomach and pylorus directly on into the jejunum, and, as Dr. Walls suggests, left in situ for the first few feedings after operation. In a case of congenital obstruction of the duodenum I carried out this maneuver after relieving the obstruction, and found it could be easily accomplished.

In the immediate after care of the child, it is given water within an hour or two after leaving the table, and the dose repeated frequently and the amount rapidly increased.

RÉSUMÉ OF LITERATURE

Scudder and Quinby (Jour. A. Med. A., 1905, xliv) compiled a very complete bibliography of the literature to January 1st of that year.

Heubner, O. (Die Therapie der Gegenwart, October, 1906), has had 49 cases of pyloric stenosis of infants, 21 of which he has studied over a considerable period of time. Under non-surgical treatment, 2 died, 19 recovered. His results form the basis for non-surgical treatment by many pediatrists, especially of the Germans. Yet he reports that "great sensitiveness of the stomach remained for years." At 3 years one child vomited and could not take solids. Another at 3 was fed by bottle and could not take solids. Two were "bad eaters" at 5. Two still showed peristaltic waves at 4, one vomiting for "years" and ceasing to complain of stomach symptoms at 7. In other words, there was starvation during the first years of the child's life. Granting that these are not "spasm" cases, but cases with hypertrophy, the results form a strong contrast with the immediate recovery after operation.

Von Starck, W. (Zentralb. f. Kinderh., 1909, xiv, 155).

Bendix, B. (Med. Klinik, 1909, v, 1813).

Bloch, C. E. (Yahrb. f. Kinderh., 1907, lxv).

These three authors also, in common with most German writers, record excellent results from non-surgical treatment — a total of 50 cases, with 3 deaths.

Robert Hutchison (Brit. M. J., 1910, Oct. 8) reports on an extensive experience. He has had 84 cases, which he divides into "private" and "hospital" cases. Following the Germans, of whom he quotes the four above mentioned, his treatment is dietetic and medicinal. Of 17 private cases over whom he had complete control, all recovered. The mortality among 64 hospital cases was 78 per cent. His paper gives absolutely no clew to the extraordinary difference in the results, which are valueless for analysis. He concludes that surgical treatment is not to be considered.

Bernheim-Karrer (Verhandl. d. Versamml. d. Gesellsch. f. Kinderh. deutsch. Naturf. u. Aerzte, 1908, Wiesb., 1909, xxv, 133; also Yahrb. f. Kinderheilk., 1908-9, lxix, 551).

These authors report a study of a number of cases, showing anatomical basis may persist after apparent cure, two and three years later.

In general, the English and Scotch favor surgical treatment, though their mortality has been high.

Still, George F. (Lancet, 1905, i, 632), had 9 divulsions with 1 death, the best results reported.

Stiles, H. J. (Brit. M. J., 1906, ii, 943), operated upon 18 cases, trying various methods, with 12 deaths.

Cautley, E. Latest of several articles is in his text-book on Pediatrics, 1910. Of 8 cases treated non-surgically, all died; of 12 operated upon, 3 died. Quotes John Thompson as having 13 deaths in 17 cases treated non-surgically, and 15 deaths in 23 cases treated surgically. Stiles operated upon most of Thompson's cases.

Pfaundler and Schlossman (Diseases of Children, 1908, iii. Translation from German). Article on pyloric stenosis by Pfaundler. Divides cases into "pyloric spasm" and "hypertrophic stenosis." Latter show well-marked uniformity, with death in 6 to 10 weeks. Spasmodic cases show wide variation, often resembling stenosis, but rarely ending in death. His article explains, I believe, the high percentage of non-surgical recoveries in supposed stenosis cases.

In America, Frank X. Walls and H. Koplik have reported the largest series of cases.

Koplik, H. (Am. J. Med. Sci., 1908, cxxxvi), reports 15 cases, mainly of the "spasmodic" variety. Has seen bad results from malnutrition, due to persistent under-nourishment. Believes cases vary in degree. In a general way advises dietetic treatment for spasmodic cases, surgical treatment for stenosis with hypertrophy.

Walls, Frank X. (Ill. Med. J., 1909, xvi, 402), and personal communications. Walls apparently has had the largest series of cases reported in America. He has had 17 cases operated upon by four different surgeons, with 3 deaths. Of these cases, 15 were of the hypertrophic type, 2 of the spasmodic type that had resisted treatment. The 2 spasmodic cases were the only ones of a considerable number that did not react to dietetic treatment, while of 4 hypertrophic cases that refused surgical treatment, 3 died. Failing to differentiate the spasmodic from the hypertrophic types would have resulted in the production of highly favorable statistics for non-surgical treatment.

DEPARTMENT OF TECHNIQUE

THE ANATOMIC REPAIR OF THE FEMALE PELVIC FLOOR

By C. M. WATSON, M. D., Pittsburgh, Pennsylvania

THE old classic operations for the secondary repair of the torn or relaxed perineum have been successful only to a degree. The more extensive the injury to the levator ani muscle the less effective are these operations. The reason of the long adherence to the operations of Emmet and Hagar, as types, has been the fact that only in recent years has the levator ani been recognized as the prime factor in perineal support. These operations depend on the union of superficially denuded surfaces, the denudation being based on the superficial line, or as in Emmet's operation, lines of the previous tear. They do not consider the levator ani muscle, or its relation to the anal sphincter.

Again, the anatomic descriptions of the female perineum have been very incomplete. This, however, does not apply to the more recent works of Deaver, Morris, and Piersol. Hill in his monograph has also made valuable contributions to this field. A clear appreciation of the anatomy is essential if one is to approach the ideal in his efforts at repair. By ideal we mean the nearest possible restoration, anatomically, and hence physiologically, to the pretraumatic state.

A ruptured or relaxed perineum produces a condition akin to hernia, and if we are to obtain the best possible result, must be treated in a manner similar to that which, at the present day, obtains in the latter, an operation based on the anatomy of the part. We will confine our consideration of the anatomy of the perineum to its anterior portion, the perineum proper, as being the only part involved in its common injuries, and bearing on the operation at hand.

Passing from without inward, beneath the skin and subcutaneous fat are the two layers of the superficial fascia, the deeper of these, corresponding to that of Colles in the male, ends posteriorly by blending with the free border of the triangular ligament. In the space between this layer of fascia and the inferior layer of the triangular ligament are the superficial muscles of the perineum, the external sphincter ani, transverse perinei, and sphincter vaginæ being of interest here. In the region of the perineal body there is an intimate intermingling of the fibers of these three muscles; particularly is this true where the more lateral fibers of the sphincter vaginæ (the bulbocavernosus) join the cornu of the external anal sphincter. Beneath these and between the two layers of the triangular ligament is a thin muscle sheet, the deep transverse perinei.

The two layers of the triangular ligament are continuous posteriorly, forming the transverse ligament of the perineum on each side and marking the anal boundary of the perineum proper. As the vagina perforates these three fascial layers they become continuous with its fibrous coat.

The structures so far described form what some anatomists have designated the inferior plane or urogenital trigone, confined to the anterior portion of the perineum, and providing additional strength to its weakest part.

The levator ani muscle, the main support of the pelvic floor, is in its anterior portion in relation below with the deep layer of the triangular ligament, lying between this structure and the rectovesical fascia above. This muscle with its enveloping fascia forms the superior plane of the pelvic floor, sometimes spoken of as its diaphragm. The levator ani is divided into an anterior portion, the puborectalis and a posterior, the ileococcygeus. The former alone is of interest in a consideration of birth injuries and their repair. This portion of the muscle arises from the posterior surface of the os pubis, separated from its fellow of the opposite side by an interval of about an inch. It forms a flat muscular bundle one inch wide which passes downward and backward along the side of the vagina, where its fibers assume two rather distinct courses, the innermost division, sometimes called the levator vaginæ, turns sharply inward to form a loop with its fellow in the interval between the lower end of the vagina and anal canal. As the innermost division turns toward the median line it

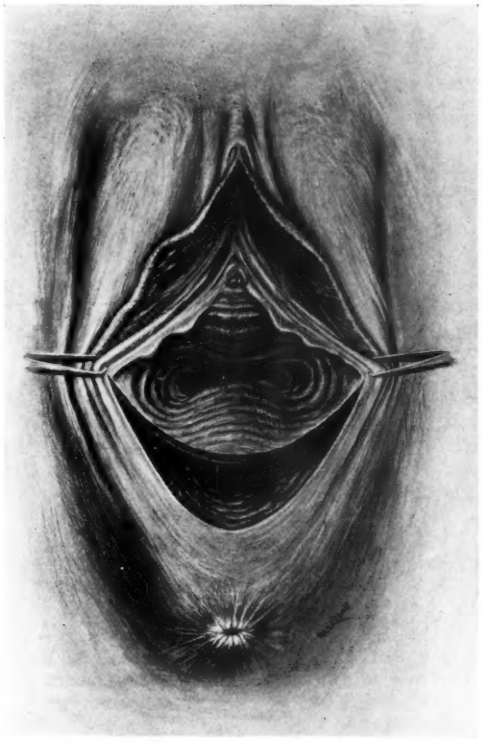


Fig. 1.

gives off a thick bundle of fibers to become inserted into the corresponding cornu of the external anal sphincter, some of the fibers becoming continuous with those of the anterior portion of this muscle. The outer division of the puborectalis continuing backward, downward, and inward, and passing wholly above the external sphincter ani, joins similar fibers from its fellow posterior to the anal canal.

TECHNIQUE

On each side of the vaginal orifice, just below and slightly internal to the orifice of the Bartholinian duct, the remains of the hymen are caught up with a small tenacula forceps and the two instruments put upon the stretch. With a pair of sharp-pointed curved scissors the tissues are incised from one tenacula forceps to the other, keeping just external to the remains of the hymen or cicatrix of the previous laceration. Picking up the summit of the posterior column of the vagina the entire thickness of its posterior wall is separated from the tissues beneath. Blunt dissection, with scissor division of a few fibrous bands, readily accomplishes this. I have not found it necessary to free the vaginal wall beyond one and one half inches, and in the majority of cases less is desirable. None of the posterior wall of the vagina is removed, except occasionally the free border of the vaginal flap is pared to free it of friable remains of the hymen, which does not hold the sutures well. Our progress so far is illustrated in Fig. 1.

The tenacula forceps are now removed and with the index finger of the left hand in the vagina palpating the levator ani and acting as a guide, a pair of sharp-pointed scissors, preferably curved on the flat, are thrust laterally inward through the fibrous tissue over the muscle, separated and withdrawn. One of the light tenacula forceps is now passed into this opening accompanied by the left index finger, either within the vagina or muscle sheath. The levator is firmly grasped and withdrawn. A similar procedure is gone through with on the opposite side, after which the two muscle bundles are united with from two to four kangaroo tendon sutures, as illustrated in Fig. 2.

Before tying the stitches in the muscle a subcutaneous suture of No. 1 plain catgut is started at the summit of the posterior wall of

Fig. 2.

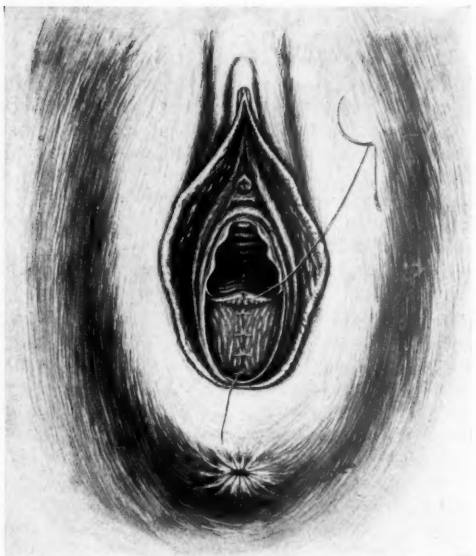


Fig. 3.

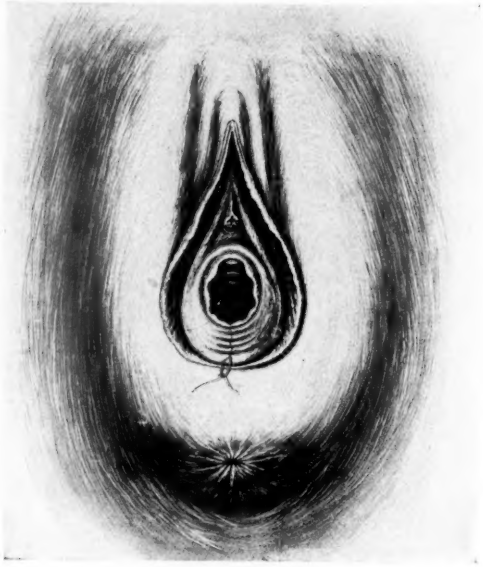


Fig. 4.

the vagina and continued outward until about half of the distance from its starting point to the anterior ends of the primary incision have been taken up on each side, the former summit of the posterior pillar dropping deeper and deeper into the vagina, as this stitch approaches the vaginal ring. This subcutaneous suture is always kept sufficiently in advance of the deeper work to keep its unfinished portion in plain view. The tendon sutures in the levator ani being tied with just enough tension to procure snug apposition, our superior plane has been restored and the most important part of the operation completed.

With an A. J. Ochsner forceps on each side, all of the remaining fascial, muscular, and ligamentous tissues are drawn toward the median line of the wound and united with three or more No. 2, 20 day, catgut sutures, resulting in the reconstruction of the inferior pelvic plane, Fig. 3. In cutting short these sutures one strand of that most posterior is left long to tie to the free end of the subcutaneous when that stitch reaches its point of completion, Fig. 4.

Absorbable sutures were first used in the perineum by Marcy, and his work in this region holds a prominent place in the development of the absorbable suture and ligature. In my first operations I removed a "V" from the posterior wall of the vagina dissecting it much higher than at present. On reading Babcock's paper, published in the J. of A. M. A. early in 1909, I ceased doing this and also substituted the subcutaneous suture, as recommended by him for the interrupted ones previously employed in the final closure of the wound. The subcutaneous stitch placed as it is beneath the more sensitive zone of the skin, diminishes greatly the postoperative discomfort, while it allows of an early sealing of the wound by the tissue exudates, thus protecting it from urine contact and infection from without.

SURGERY OF FRACTURES AND DISLOCATIONS OF THE NOSE

By JOHN B. ROBERTS, M. D., Philadelphia, Pennsylvania
Professor of Surgery in the Philadelphia Polyclinic

FRACTURES of the bones and cartilages of the nose and dislocations of the same structures have very similar symptoms and require almost identical treatment. The cartilages and bones, forming the framework of the nose, are united with each other and with their neighbors by sutures at which normally there is no motion. If a dislocation occur, between a bone of the nose and an adjoining bone or cartilage, the rupture of the suturelike connection is very similar to a separation or fracture of bony tissue itself. Such dislocations show displacement and deformity. There is also preternatural mobility at the line of junction, because the bond of union has been torn. The dislocation therefore shows deformity, displacement and preternatural mobility and such symptoms are also characteristics of fractures. A fracture may show no preternatural motion, if the fragments are impacted. Immobility may also be present in dislocations.

The nasal or ascending processes of the two maxillæ form part of the lateral walls of the upper portion of the nose, and are quite often involved in crushing injuries of the nasal framework. It may be well therefore to include fractures of that part of the jaw bones in a discussion of traumatisms of the nose.

Fractures of the nasal bones are due to direct force. The fragments are not subject to secondary displacement from attached muscles, but may, especially when comminuted, be somewhat changed in position by attempts at blowing the swollen nose or by sneezing.

A common form of fracture of the nasal bones is a transverse lesion near the middle, in which the lower fragment is driven backwards at an angle with the upper fragment. Each nasal bone is supported by the frontal bone and the perpendicular plate of the ethmoid above and behind, the nasal portion of the maxilla externally and the companion nasal bone at the middle line. The lower portion of the nasal bones at their median suture is supported by the quadrangular cartilage of the septum. When the fracture just described occurs, the quadrangular cartilage may receive the force of the blow, and be driven backward with the lower portion of the nasal bone which has been broken off. As a result the cartilage may be bent or fractured, or be dislocated from its attachment to the upper border of the vomer; or its lower anterior angle may be torn loose from the membranous portion of the septum near the lobule of the nose, or from its connection with the maxillary bones at the anterior end of the vomer.

In some fractures of the nasal bones the comminuted fragments are driven directly backwards so as to lie behind the nasal processes of the maxillary bones. Instead of a fracture, or coincident with the fracture, a luxation may occur between the nasal bone and the nasal process of the maxilla. The nasal bones while remaining attached to each other in the median line, may be dislocated, and occupy a somewhat similar relation to one or both maxillæ. If the blow is received on the side of the nose rather than the front, the two

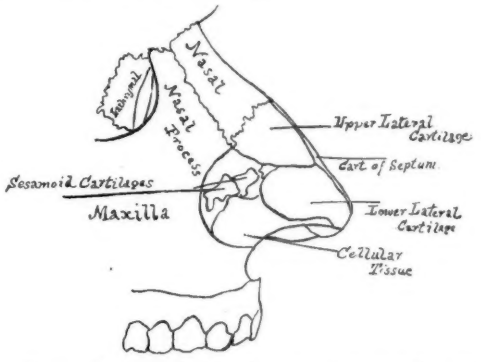


Fig. 1. Diagram of side of nose showing relations of bones and cartilages.

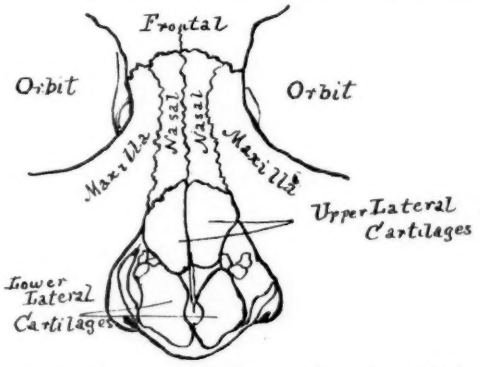


Fig. 2. Diagram of the bones and cartilages of the front of the nose.

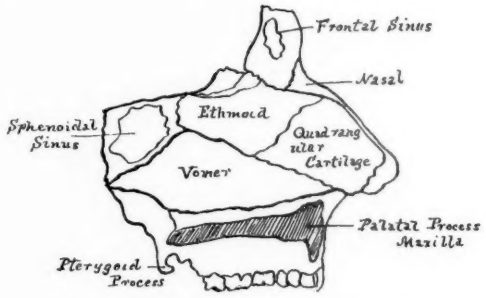


Fig. 3. Diagram of the septum of the nose.

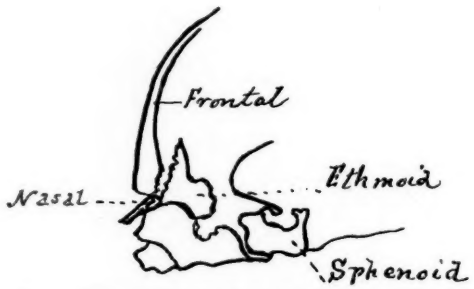


Fig. 4. Diagram showing how the frontal, nasal and ethmoid bones may be fractured and driven backwards and upwards into the cranial cavity.

nasal bones may be luxated together, the outer edge of the nasal bone on the side of the injury being driven under the border of the maxillary process, while the outer edge of the other nasal bone is displaced on top of the maxillary process. In severe injuries the nasal processes of the superior maxillary bone may be fractured as well as the nasal bones themselves. In children a blow from in front may cause the two nasal bones to be separated at the internasal suture. The suture opens at its posterior surface and the arch of the nasal bridge is flattened.

The frontal bone and the horizontal plate of the ethmoid bone may be involved in severe fractures of the nose in such a way that the fragments are driven into the cranial cavity. In such cases impaction may occur. Meningitis or cerebritis may develop as a result of infection due to the injury. Even when impaction does not take place, infection may occur through fissures in the frontal and ethmoid bones. The frontal sinus is very likely to be opened. This complication increases the probability of infection in such severe fractures at the root of the nose. The cribriform or horizontal plate of the ethmoid is not likely to be fractured, when the force injuring the nose spends its strength upon the lower third of the nasal bones. It is the perpendicular plate of the ethmoid bone that then bears the brunt of the injury.

Fractures of the nasal septum, which is partly bony and partly cartilaginous, occur in connection with fractures of the nasal bones. This has been mentioned above. The vomer is not often broken. This escape is due to its position at the lower and back part of the nasal chamber. It is the perpendicular plate of the ethmoid, upon which the upper part of the nasal bones rests; and the quadrangular septal cartilage, which supports the lower portion. This bone and this cartilage are therefore apt to be broken before the force reaches the vomer. When the force is received upon the upper part of the bridge of the nose it is the ethmoid that is likely to be fractured. It is the quadrangular cartilage of the septum, which is liable to be injured when the traumatism acts on the lower part of the dorsum of the nose. The line of fracture is perhaps more frequently horizontal in its general direction than vertical, and a luxation of the cartilage from the vomer is more common than from the ethmoid. In many instances, however, the fracture is associated with dislocation of the cartilage from the vomer or the ethmoid bone, and may assume more or less the character of a triangular fracture-dislocation. The fragments of the cartilage or of bone and cartilage may override so that the line of the bridge of the nose shows a marked depression in the region of the lateral cartilages.

The lateral cartilages, which form the lower portion of the bridge of the nose, may be dislocated from the lower border of the nasal bones and from each other. Mention has already been made of the possibility of a dislocation of the cartilaginous portion of the septum from the ridge on the upper surface of the intermaxillary suture and from the upper border of the vomer.

It is essential that all recent injuries of the framework of the nose be promptly and skillfully treated, so that deformity from unreduced or carelessly replaced tissues may be averted. Injuries, which are insignificant, so far as danger to life is concerned, may leave distortions of the outline of the nose or obstructions to breathing of great importance. Cosmetic reasons therefore and the necessity of having unobstructed nasal ventilation and breathing, especially in children, should stimulate medical attendants to give attention to traumatisms of the nose.

Many fractures and dislocations of the nose

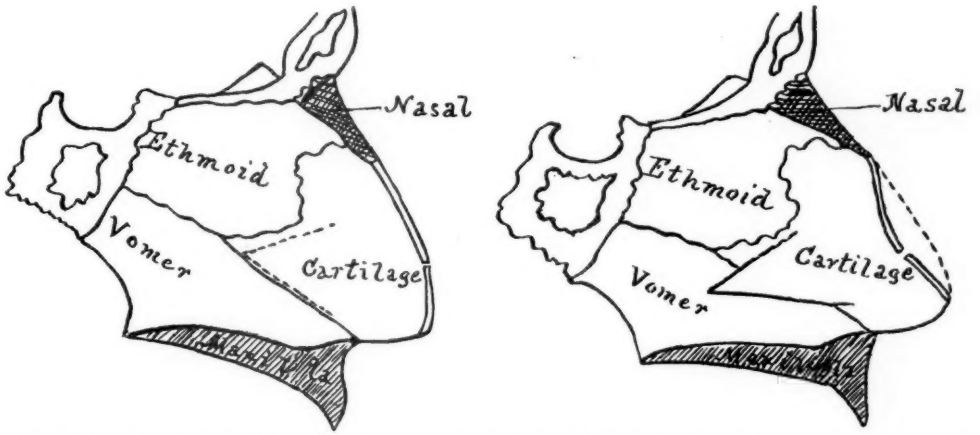


Fig. 5. Diagrams of septal lesions due to blow from in front. Chevallet produced this form of displacement on cadaver. Observe the V shaped fracture-dislocation of quadrangular cartilage and the overlapping of the V on the vomer. There may be a dislocation from both ethmoid and vomer or partly a fracture and partly a dislocation.

are accompanied by wounds of the mucous membrane or skin; but, notwithstanding this open condition of the bony or cartilaginous injury, grave infection is unusual. This relatively aseptic healing is due to the abundant blood supply of the injured parts and the cleansing of the mucosa by the secretions from the lining membrane of the nasal cavities. Necrosis is not very usual even when the bones and cartilages have been greatly comminuted. Severely damaged soft tissues will often survive, if cleansed and sutured into their normal relations.

Bleeding from the interior of the injured nose is generally free, but does not usually require any special treatment other than the external application of ice or washing out the nasal cavity with cold water. Solution of extract of suprarenal glands may be sprayed into the nostril, if a more active astringent seems to be demanded. Pressure with the thumb and forefinger so as to close both nostrils, maintained for five or ten minutes will often stop bleeding from the nose. This maneuver acts by preventing nasal respiration and its attendant displacement of clots of blood. Plugging the nasal cavity on one or both sides may occasionally be required. This is best done with successive pieces of aseptic marine sponge threaded on a strong cord and pushed into the nose through the anterior naris until the space is firmly filled. Marine sponge is better than gauze or cotton. The plugs should not be left in position more than two days. Then the nasal cavity may be flushed with a mild antiseptic solution, and repacked if necessary.

The rapid swelling, which accompanies these injuries of the nose, soon obscures deformity in its framework and causes many fractures and luxations to be overlooked. Anæsthesia with nitrous oxide or ether should be employed, when a systematic examination is prevented by pain. Local anæsthesia with cocaine may be sufficient. Reflected light from a forehead mirror is an essential in many cases, because persistent obstruction to respiration from unreduced septal injuries may lead to mouth breathing and its attendant changes in the mandible and throat. Saddle nose, bent nose, twisted nose, and occlusions more or less complete of one or both sides are frequent witnesses of unrecognized or untreated nasal injuries.

When displacement has been found, readjustment of the fragments or of the luxated structures must be promptly effected. Unless the reduction of the fracture or dislocation is accomplished within about eight days, perfect adjustment is difficult. Fractures are firmly united in from two to three weeks. As a rule there is comparatively little callus. The masses of deforming bone found in old unreduced fractures are largely made up of comminuted fragments, which have not been replaced at the time of the traumatism.

The character of the injury and the form of displacement are to be determined by palpation of the exterior with the fingers, assisted by a rigid slender instrument within the nose for counterpressure. Inspection of the nasal cavities will be of service and may be supplemented

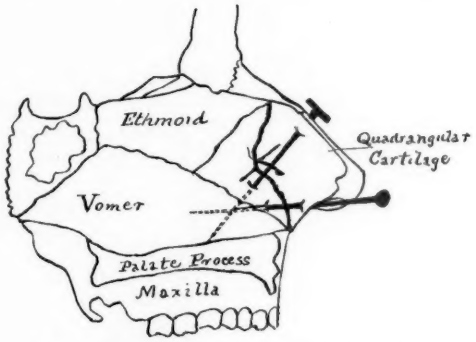


Fig. 6. Diagram showing use of pins to hold fragments of fractured septal cartilage in corrected position. One pin is thrust through the dorsum of the nose, the other is inserted into the nostril.

by exploration of their interior with a probe. Cartilages may be broken and then spring back into position so that no displacement of fragments remains. The mucosa may show scarcely any damage except a red line over the break in the cartilage.

Emphysema of the eyelids and cheeks may indicate that the accessory sinuses have been opened by the fracture. Imperfect drainage of tears from the eye to the lower nasal meatus is presumptive evidence that the nasal duct has been obstructed by swelling of its lining mucous membrane or by a distortion of its bony wall by reason of associated fracture of the maxilla. Escape of cerebrospinal fluid from the nose indicates that the floor of the anterior fossa of the cranium has been invaded by lines of fracture through the ethmoid or the frontal bone.

It is well to recollect, when examining the interior of the nose for septal fractures that they occur most frequently in the posterior two-thirds of the quadrangular cartilage or the anterior half of the bony septum.

Fractures of the nasal bone with or without

Fig. 7. Tubular nasal splints.

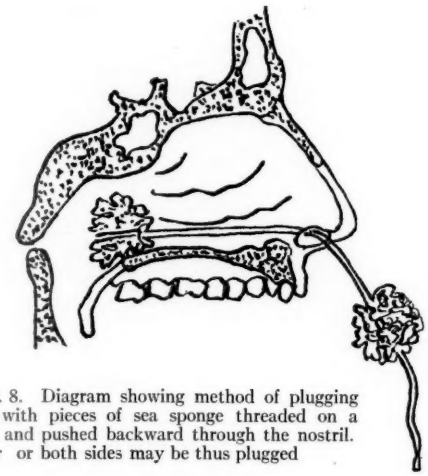


Fig. 8. Diagram showing method of plugging nose with pieces of sea sponge threaded on a string and pushed backward through the nostril. Either or both sides may be thus plugged

fracture of the adjoining nasal processes of the maxillæ usually produce a depression in, or a flattening of, the bridge of the nose. Broadening of the nasal arch as well as flattening, and lateral deviation with or without angularity may also occur. Dislocations of these bones produce similar deformity. Dislocation of the lateral cartilage from the lower margin of the nasal bone causes a hollow in the dorsum of the nose near the junction of the middle and lower thirds. Fractures and dislocations of the septal structures may accompany the lesions of the bony bridge of the nose and give deviations of the nasal partition. Both nostrils may be obstructed by the oblique position given a septal fragment. Elevation or other restoration of the displaced fragments of the osseous arch of the nose can best be accomplished by introducing a narrow steel rod through the nostril. Its inner end should be thrust upwards under the nasal bone of the corresponding side. The surgeon then pushes the displaced bone or fragment into position by the exercise of considerable force. The fingers of the unoccupied hand of the operator are kept upon the cutaneous surface of the bridge of the nose, to mould the fragments into place and to determine the exact result of the internal pressure. When the bones or their fragments are impacted over or under the maxillary process, the counterpressure of the fingers on the outside is an invaluable aid in facilitating reduction. The steel rod must be narrow enough to go up to the top of the space between the nasal bone, the ethmoid plate, and the process of the maxilla. There is very little room there.

Fig. 9. Lateral deviation of nose.

Fig. 10. Twisted nose.

The manipulations to restore a displaced septum may be performed by a fingertip inserted into a naris, but usually a strong flat blade forceps is better. The blades should be parallel. The front part of the septum should be grasped with the forceps, of which one blade enters each naris, and should be pulled forward. At the same time the posterior end of the fragment in the grasp of the forceps should perhaps be tilted upward by depressing the handle of the forceps. This maneuver combined with lateral movement, which may not always be required, will restore usually the line of the nasal bridge from forehead to the tip of the nose, and get the obstructing fragment of cartilage or bone into the middle of the cavity of the nose. Some form of bougie should be passed into the nostrils to insure complete patency on each side of the septum.

If sufficient time has elapsed since the injury to cause partial union of the displaced fragments strong lateral movements must be made with the forceps to break up the fibro-osseous connection. If such rupture is not possible, resort to the chisel and saw becomes necessary.

The corrected position of the nasal bones, lateral cartilages, and septal structures is to be maintained by nasal pins, or internal splints, and perhaps by external pads attached to forehead bands. The last, I believe to be seldom necessary. There is, as a rule, little tendency for the replaced fragments of the bones of the nasal bridge to drop inwards or be displaced in other directions, unless the patient handles his nose or blows it violently. When such a tendency exists, because of great comminution, a small strip of gauze packing may be used to fill the intranasal space directly under the bony bridge on the required side of the septum. Instead of this the tie beam method of support may be used. This consists in thrusting a steel pin or drill transversely through the nose under the bony bridge. It may go through the nasomaxillary sutures or through drill holes in the nasal processes of the maxillæ or between the comminuted fragments of the nasal bone itself. If the support of the pin is insufficient to keep the arch of the two nasal bones established, a piece of cork or a flat leaden shot may be clamped on the point of the pin. The skin should be protected with pieces of rubber under the shot or the head of the pin. Two or three days are long enough to leave the pin in position.

Instead of the pin or drill a rubber thread may be carried through the drill holes, and shot protected by rubber disks may be clamped on its ends. This will give lateral pressure and permit swelling or shrinking of the soft tissues without injuring the skin or disturbing too much the desired lateral pressure.

Old unreduced fractures and dislocations require osteotomy or refracture, and readjustment. Much may be done by dividing cartilage and bone from within the nose. The operator punctures the mucous membrane in the necessary places and by thrusting small saws or chisels under it reaches the bone or cartilage to be divided. The overlapping soft parts may be detached from the bones and cartilages by the free use of a tenotome. When necessary, small external incisions may be made to admit a small saw or chisel or a tenotome. These often need no subsequent suture to close them. To uncover more extensive areas incisions and flaps may be made with small sharp knives. After the bones have been divided and the readjustment has been completed, fine sutures of linen

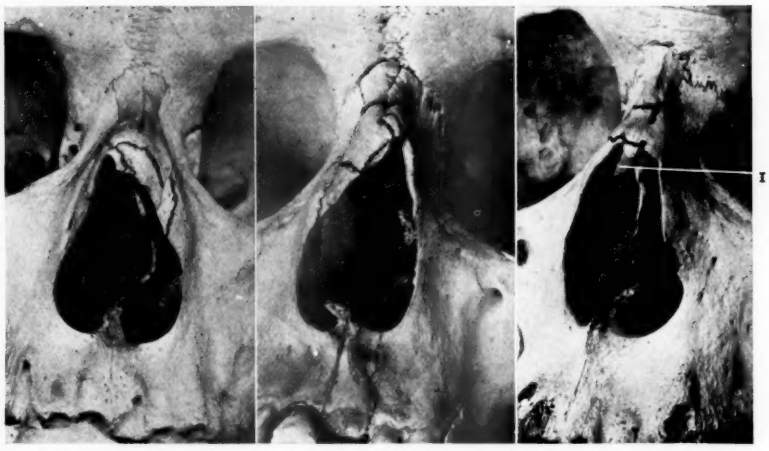


Fig. 11. Fig. 12. Fig. 13.

Fig. 11. Fracture of nasal bones and nasal process of left maxilla. Lines of fracture indicated with ink. Mütter Museum specimen, from cadaver in dissecting room. Old fracture of nasal bones and left maxillary process. Union. Both nasal bones were fractured near lower end and a small piece was detached from the anterior margin of the left maxilla at base of the nasal process. The fragment of the maxilla, the fragment from the left nasal and the anterior part of the right nasal are bent inward towards the nasal cavity. The left zygoma in front of and behind the temporo-malar junction has been bent inward as if there had been a green stick fracture in youth. The mandible has been broken and united near right mental foramen. Blow causing all came evidently from left. Great deflection of front part of ethmoid and middle of vomer to left. Vomer was seat of a horizontal fracture.

Fig. 12. Fracture of nasal bones and nasal process of right maxilla. Lines of fracture indicated with ink. Mütter Museum specimen. Fracture of both nasal bones transversely at middle. Right bone comminuted near lower margin. A small chip was broken from anterior edge of base of nasal process of right maxilla. Union. Deformity, which is not great, consists of deflection of lower portion of nasal bones to the left. Blow evidently came from right side. Great deviation of ethmoid to right so that it nearly touches the inner surface of the nasal process of the maxilla. The ethmo-vomerine suture is angular towards the right and the vomer is greatly deflected in that direction along its horizontal diameter. It looks as though the ethmoid had been fractured near to and parallel with the ethmo-vomerine suture.

Fig. 13. Fracture and dislocation of nasal bones. Lines of fracture and dislocation indicated with ink. Mütter Museum specimen. Transverse fracture of both nasal bones near the middle. Union without much displacement. Both lower fragments are a little depressed at their upper margins, below level of upper fragments. The outer edge of the left nasal has been slightly dislocated upon the nasal process of the maxilla and union has occurred obliterating the suture there. The upper anterior corner of the ethmoid plate was also fractured as shown by thickening and a slight deviation toward the right. [The white triangular spot below the right nasal bone designated by the figure 1, is due to light coming through a fissure in the wall of the orbit. It has nothing to do with the fracture.] The nose in life was probably saddle nose to a slight extent. No history found of this specimen.

or silk restore the cutaneous surface. The scars soon disappear, especially if the cut in the skin has been made obliquely to the surface.

Sometimes saddle noses, due to fractures can best be corrected by subcutaneous paraffin injections. Instead of using hot paraffin, cold or more or less solid paraffin may be employed, as in other cases of sunken bridge, if the dangers of embolism are feared. This material is best injected with a syringe, having a piston driven by a screw attachment and a needle of large caliber.

In old uncomplicated lateral deviation of the bony bridge of the nose, Mosher makes a small incision in the skin at the outer border of the lower part of the nasal bone. With a chisel about 1/8 of an inch wide he cuts this bone from the ascending process of the maxilla. By slipping up the skin this can be done through a very small incision. He then turns the chisel at right angles and cuts the nasal bone loose from the frontal. This detachment is made on both sides of the nose and must be complete so that the bony nasal bridge is freely movable. It is returned to its normal position in the median line and held there by some form of external splint. Modeling compound or superimposed layers of adhesive plaster will usually be sufficient.

When the lateral deformity involves the cartilaginous as well as the bony bridge, the septal

cartilage is usually bent and therefore occludes the naris on one side. Mosher says that when a perpendicular fracture makes a knuckle in the quadrangular cartilage, this prominence should be dissected out submucously. He stops removing the cartilage a quarter of an inch from the top of the cartilaginous bridge. If the upper lateral cartilage is displaced, it is removed by dissection within the nose. When these intranasal procedures are completed, the nasal bones are chiseled loose as described above and returned to their normal median situation. There may remain a protuberance, due to the prominence of the nasal process of a maxilla, from which a nasal bone has been chiseled loose. This is cut off with a chisel, entered through the cut made to get access for the nasal osteotomy, and then is shoved down towards the interior of the nose.

Sometimes there remains lateral deformity at the point where the bony bridge and the cartilaginous bridge join. The skin should be cut at this point and a chisel used to separate the quadrangular septal cartilage from the under surface of the tip of the nasal bone. If this maneuver is not sufficient to allow the operator to straighten the nose, a half inch incision should be made downward and backward into the perpendicular plate of the ethmoid. Then a straight nose may usually be obtained by modeling. Proper retentive appliances should be employed for two or three days.

A POSITION FOR SAVING TIME AND FACILITATING COMBINED ABDOMINAL AND PELVIC OUTLET OPERATIONS[1]

By A. C. SCOTT, M. D., Temple, Texas

AMONG the elements which enter into the problem affecting the general results of surgical operations, the one which stands pre-eminently above others, is time. That this fact is not known, or is wholly unappreciated, is evidenced by the slow, tedious, time-killing methods used by many surgeons, and the utter disregard of time often exhibited during the progress of surgical work. This is perhaps more noticeable in the practice of those who have little experience or untrained assistants. It is occasionally observed in the work of some surgeons who have had very wide experience extended over a period of many years, but who are naturally slow and have not calculated the added risk from anæsthesia, shock, loss of resistive power, etc., sufficient to overcome such a natural tendency. We can criticise the natural tendency of the slow, poky surgeon with great freedom, for the writer was once upon a time "the greatest sinner of them all" and it was only after many surprises and sad experiences that he awoke to a proper realization of his errors and made unceasing efforts, before he could lay any claim to being placed in another class.

When we speak of time saving, we do not wish to lead one to infer that we would approve slighting the work in any respect, or actually getting in a hurry, for neither prove in the end to be good substitutes for careful, deliberate technique. It should be remembered that one may be careful and deliberate without wasting time, and it is wasted time that is so unprofitable and often harmful to the patient's interests. Every minute of useless anæsthesia, every minute of useless exposure of the intestines or open wound at any other point, constitutes an additional element of risk to the patient's life, which may be indicated by lowered resistive power, vomiting, shock, suppression of the urine, pneumonia, sepsis, intestinal paresis, etc.

For many years, the writer and his associate, Dr. R. R. White, have given much thought to this feature of surgical technique, and have found many little details which contributed to the economy of time. It is one of these small details which we have thought proper to present to you to-day.

Before describing the position referred to in the caption, we will attempt to show in a measure its necessity by a brief discussion of the two most common and useful positions for surgical work.

TRENDELENBURG POSITION

In work about the abdomen and pelvis, the modern surgeon can scarcely estimate the value of the Trendelenburg position, which is obtained by allowing the knees to flex at a right angle over the

[1] Read before the Southern Surgical and Gynecological Association, Nashville, Tennessee, December 14, 1910.

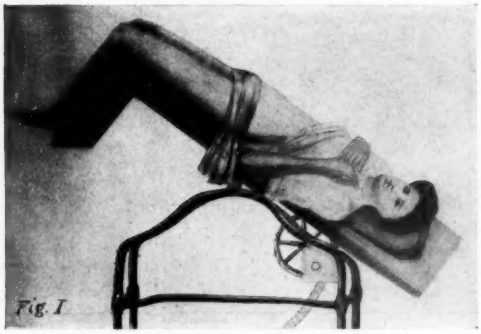


Fig. I

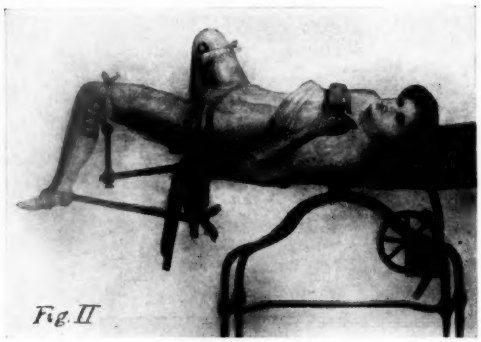


Fig. II

padded edge of the table, which is then elevated at an angle of about forty-five degrees. While in this position (Figure No. 1) it will be noticed that the thighs are parallel and close together, and the perineum is some twelve to eighteen inches from the edge of the table, according to the length of the patient's thighs—a position in which it is impossible to do any work about the pelvic outlet.

DORSAL POSITION

A most useful position for work about the vulva, vagina, perineum and rectum is the dorsal position, which is usually obtained by swinging the feet in upright stirrups, or hanging the knees over knee holders supported by upright bars, fastened at the corners of the table. In this position, the perineum is brought over the edge of the table so a self-retaining or Sims' speculum may be used. The thighs are flexed to or beyond a right angle to the body. The surface of the table is horizontal, or nearly so, and if elevated to a marked degree the patient may slide back from the edge. While in this position, the flexion of the thighs renders work within the abdomen very difficult or impractical altogether.

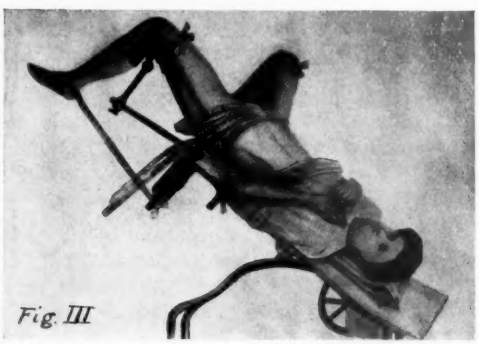


Fig. III

From a consideration of the above facts, it is to be noted that it is not ordinarily feasible for operative work in the abdomen and pelvic outlet to proceed at the same time; hence, in the numerous instances when patients require operative work both in the abdomen and pelvic outlet, *one operation must be finished before the other is begun*, and usually the change of position requires considerable time and creates confusion on account of disarrangement of sterile sheets and towels which may come in contact with some unsterile part during the change.

A POSITION FOR COMBINED OPERATIONS

By use of any metal knee holder which fits comfortably in the popliteal space (we use Behrhoffs') one may secure exposure of the abdomen in an elevated position, and, at the same time, exposure of the pelvic outlet, making possible the use of self-retaining speculums, if desired, and permitting combined or multiple operations to be made simultaneously through the abdomen and pelvic outlet (Figures 2 and 3). This is accomplished by having the popliteal knee holder (Figures 4 and 5) hinged on a short upright bar (c), which is broadened and slotted at the lower end to slide with a set screw upon a horizontal bar (a), which in turn is fixed to a strong cylindrical upright bar (b), sliding in a vicelike clasp at the side of the operating table. The sliding upon the horizontal bar allows adjustment for the varying lengths of patient's thighs. The cylindrical upright bar (b) at the side of the table, by sliding up or down, permits the thighs to be moderately flexed or fully extended, and, by rotating, permits abduction or adduction at will.

Before starting the anæsthetic, the patient's hips are brought beyond the edge of the table and the limbs placed upon the knee holders. A piece of bandage loosely wound about each angle is tied to a convenient point below the corner of the

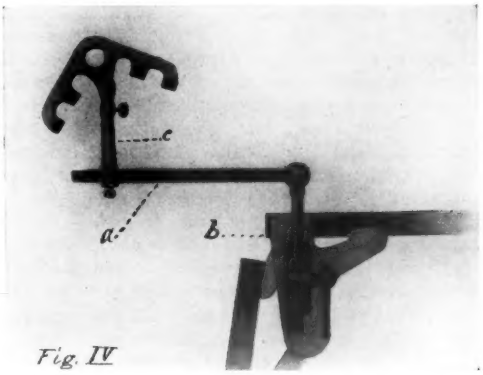


Fig. IV

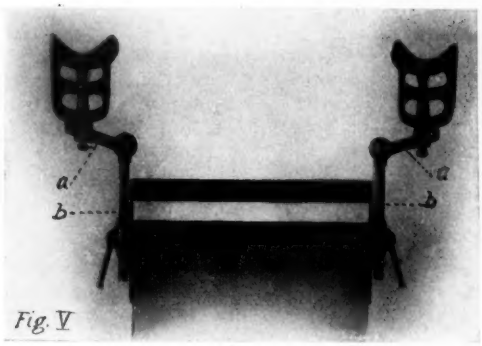


Fig. V

movable part of the table to prevent extension of the limbs, another is placed above each knee to prevent elevation of the knees, thus securely holding them in their respective knee holders. Any modern operating table will serve the purpose for these attachments and enable one to secure the desired combined position, if it has a pivotal point about the center permitting the entire surface of the table to be raised or lowered at will. We use a modification of the Markoe table, which operates with wheel and ratchet and can be changed by the anæsthetist with perfect ease.

After the patient is in position and the anæsthetic is begun, the foot of the table is lowered some five or six inches for convenience of completing the preparation when thorough rinsing of the abdomen and vagina is practiced. This is done and the table returned to the horizontal plane without again having to take hold of the patient with the hands.

When it is anticipated that the abdominal work may be at all difficult or complicated, it is usually begun first and carried beyond the difficult point before the pelvic work is begun. If, on the other hand, the case requires shortening of the round ligaments and colporraphy or amputation of the cervix, it is better for the cervix work to be completed first, in which case neither operator on these parts nor his assistants take any part in the abdominal work without change of gown and gloves. To prevent possible contamination of the abdominal wound from the pelvic outlet, a towel is loosely folded across the pubis and upper part of the vulva and pinned to the skin with a sterile safety pin to securely hold it in place. Of course, instruments, sponges, etc., for the pelvic outlet work are kept on a separate table from all others and are not handled by the nurses taking part in the abdominal work.

In a large number of cases, it is entirely practicable for two operators, or an operator and trained assistant, to work on separate parts, beginning at the same time and finishing at approximately the same time, thus reducing the time required fifty per cent; for instance, the operator working through the abdominal wound may remove a diseased appendix, Fallopian tubes, etc., while the other dilates the cervix, curettes the uterus and removes hemorrhoids, or, while one removes an uncomplicated tumor or shortens the round ligaments, the other may do a curettement and perineorraphy.

In hysterectomies for uterine carcinoma, one may sterilize the cervix with the actual cautery and close it by suturing, then apply Pryors' clamps to the uterine arteries, while the other ligates the ovarian vessels and round ligaments and separates the bladder from the uterus, incidentally guiding from above the application of the clamps from below.

In cases of diffused peritonitis in women, it is very desirable to drain through both the abdominal wound and Douglas's pouch, and finish the work quickly. With a patient in this position, without elevation, this work is greatly facilitated and the time required is very short indeed. Many times during difficult operations through the abdominal route, good retraction is of extreme importance. The assistant standing by the operator's side cannot see to advantage and gets in the operator's way to an annoying degree. With the patient in this position, the second assistant stands between the widely abducted thighs close up where he can see well, standing upon a stool, if necessary, and makes retraction both right and left with facility, and, if necessary, may sponge and ligate with advantage equal to the first assistant.

SUMMARY

The combined position here described possesses the following advantages:

First. Where two operators are working together with plenty of assistants at their command, the time required for many combined or multiple operations may be reduced to a marked degree and often as much as fifty per cent.

Second. The final preparation of rinsing both the abdomen and the vagina is easily accomplished while the anæsthetic is being given, without having to lift or disturb the patient again.

Third. By use of a folded towel pinned to the pubis, with other protective towels or sheets placed about the field, the surgeon may change from one field of operation to the other without any disarrangement or risk of contamination of these articles.

Fourth. By changing the axis of the table, the pelvis and abdomen may be lowered, if desired, or elevated, to secure the advantages of the Trendelenburg position at any stage of the abdominal operation, without interfering with work simultaneously being done upon or through the pelvic outlet.

Fifth. All the advantages of the Trendelenburg position may be obtained without its disadvantages.

Sixth. All the advantages of the dorsal position for pelvic outlet work are obtained without flexing the thighs upon the abdomen or otherwise interfering with work required through the abdominal wall.

Seventh. By wide abduction of the extended thighs during abdominal operations, room is made for a second assistant to stand with advantage for sponging, ligating, and retracting equal to the one standing directly across the table from operator.

A CASE OF OMENTAL MYXOSARCOMA

By ANGUS McLEAN, M. D., Detroit, Michigan

THE following case is reported on account of its rarity and extreme interest. At the time of operation and after the pathological diagnosis of myxosarcoma had been made a very guarded prognosis was given. Contrary to expectations the patient has for three years enjoyed a fair degree of health and comfort. At present there are no signs of recurrence.

Patient, Mr. H. U., aged 55. Druggist. History: Family history negative as to any specific or malignant disease. One sister and one uncle died of tuberculosis. Personal history. Mr. H. U. was perfectly well up to 1904 (four years before I first saw him). At this time he experienced some pain and soreness in his abdomen which was intermittent in character. In 1907, three years after the onset of this first pain and soreness, a sense of fullness accompanied by obstinate constipation, and loss of appetite appeared. At times he would be slightly jaundiced. All these symptoms increased and in order to obtain even a slight degree of rest he was obliged to resort to anodynes.

About July, 1907, three and a half years after the beginning of his illness, the distress from the distension became the most troublesome symptom.

Three and four grains of morphine were required a day. At no time was he confined to bed. However, walking or any sudden movement, especially turning about rapidly would cause most excruciating pain. Lying prone was impossible and during sleep he was forced to assume a semi-upright position.

The patient first came under my observation in February, 1908. Examination. Abdomen markedly distended. When lying on his back, as best he could, there was dullness extending to the flanks on either side. On turning on his side the dullness in the flank opposite to the one on which he was lying disappeared, showing the presence of free fluid in the abdominal cavity. The dullness in the umbilical region however persisted no matter what position he would assume.

On palpation a firm body could be outlined filling the whole umbilical region.

His urine was normal. His blood showed the percentage of hemoglobin diminished to 80. There was a relative polymorphinuclear leucocytosis. (Polymorphinuclear 82.7 per cent, large lymphocytes 8 per cent, small lymphocytes 9.3 per cent.)

Diagnosis. This was rather obscure but we felt that we were dealing with a slowly growing, large movable tumor, ascites.

The patient was admitted into Harper Hospital and operated upon February 13, 1908.

Operation. Upon opening the abdomen about three quarts of ascitic fluid escaped. In this fluid there were hundreds of mucin globules about the size of peas. The tumor presented in the incision and could plainly be outlined with the finger in the abdomen. The incision was enlarged and the tumor drawn through it. There were a few adhesions to the small intestine which were easily freed. The tumor occupied all the great omentum extending downwards from the transverse colon. It was carefully dissected from its colonic attachment and ligated piecemeal. The blood supply was rather meager and bleeding in the course of the dissection was easily controlled.

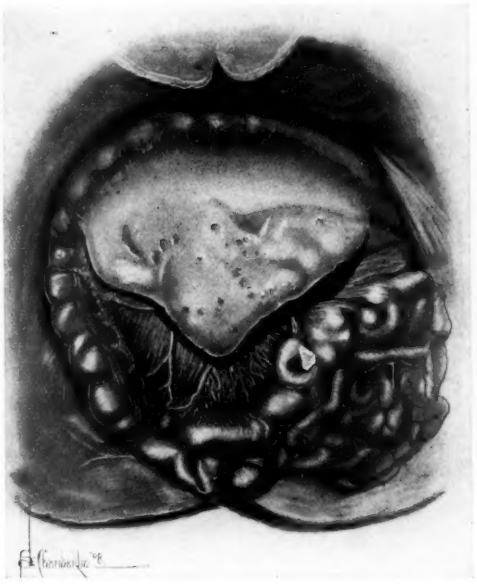
The tumor weighed ten pounds. The shape was peculiarly pointed at the lower end as seen in the accompanying drawing. Transversely it measured ten inches, perpendicularly eight inches, while its thickness was about two inches.

Pathologically the tissue was a myxosarcoma, the sarcomatous cells being of the small round cell variety.

The convalescence of this patient was uneventful. From the first the abdominal pain and bloating disappeared. His health for the first four months following the operation was good, his appetite returned, and his bowels moved normally.

During the fifth month after the operation, fluid again accumulated in his abdominal cavity, causing pain and vomiting, the latter especially after eating. Paracentesis was performed four times during two months. After each tapping the pain and vomiting would disappear until the fluid would again by its quantity cause distress. After the fourth tapping ascites did not recur. A reason for the non-recurrence we are unable to give. The last withdrawal of fluid took place in September, 1908.

The patient came from under our observation and was not again seen until January, 1911, about three years after the omental tumor had been removed.



An omental myxosarcoma.

At this time he informed us that he had been fairly comfortable, and that the pain, vomiting, and continued feeling of distress had entirely disappeared. He however complains of a feeling of "general weakness."

As far as we could ascertain there were no signs of any recurrence. His abdomen was not distended nor were there any signs of ascites. He is still somewhat anemic. His blood showed nothing abnormal except a reduction of hemoglobin to 80 per cent.

A NEW PROSTATIC DEPRESSOR

By GEORGE F. SHILEY, M. D., Seattle, Washington

IN removing the prostate by blind enucleation through a median perineal incision and employing an ordinary sound to depress the gland, we have felt at times the need of some mechanical aid by means of which more depression and a better fixation of the prostate could be secured than it is possible to obtain with the sound.

I have devised an instrument which after two years of trial as a means of depressing and fixing the gland in prostatectomy by the above-mentioned method, seems to meet the requirements.

Figure 1 shows the instrument closed and unlocked; (a) is a front view of the tip.

Figure 2 shows the instrument opened and locked; (b) front view of tip; (c) shows the tip as seen from above; (d) is a section of the handle showing the lock by means of which the tip is firmly held in either the open or closed position.

The closed instrument is passed into the bladder in the same manner as the sound, the instrument is opened by pressing inward the ring on the handle and it is then locked by means of the latch on the handle. By reversing these maneuvers the instrument is easily removed.

An instrument having the curve of an ordinary sound can be used in the majority of cases. When the prostate is of considerable size an instrument having a prostatic curve is required.

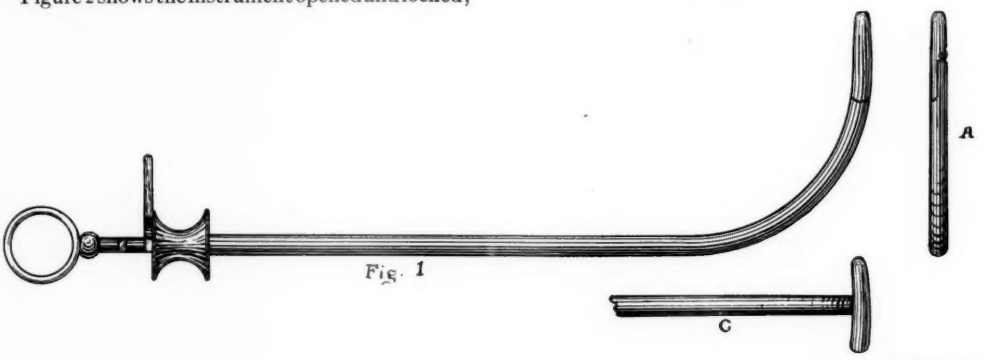


Fig. 1

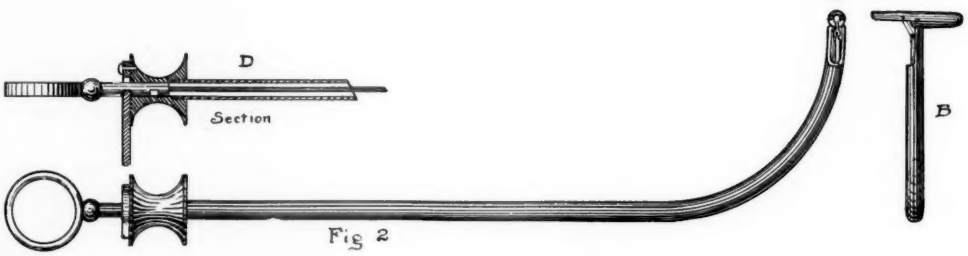


Fig 2

COMPLETE ANATOMICAL AND FUNCTIONAL RESTORATION OF THE ANUS

By HENRY T. HUTCHINS, M. D., Boston, Massachusetts

THE number of cases where the rectum opens into another viscus with congenital, total absence of the anus is small. Not including the "blind pouches," imperforate anus, and other abnormalities, the organs into which the rectum opens most frequently are (1), the vagina, (2), the urethra and (3), the bladder. In 50 per cent of the cases the rectum opens into some point in the vagina. These form the less serious group of malformations and seldom require immediate operation after birth. In fact, not infrequently, adult life is reached without knowledge of this deformity, which may be discovered only while making an examination for other trouble. The case reported below is one of this type.

The urgency of the operation in such cases depends on the location and size of the opening, which usually determines the amount of control which the patient has over the bowel movements both when formed and when loose.

In some cases a true, normal anus is present, although the anal canal may be only from one-quarter of an inch to one or two inches in depth and end in a blind sac. In other cases there is absolutely no trace of an external anus, the skin coming together in a normal median raphé with no dimpling, discoloration, or other external sign.

The voluntary control of feces by the patient in such malformations (speaking only of those cases where the bowel opens into the vagina) depends upon two factors: (1), the amount of sphincter remaining around or near the opening and (2), the obliquity of the terminal portion of the rectum before it reaches the vagina. In by far the larger number of cases reported, the sphincter is either entirely absent or in no way associated with the bowel. The control of feces which such a patient will possess will depend upon the compensatory hypertrophy of an internal sphincter or the muscular coats of the rectum, aided by the mechanical obstruction offered by an oblique position of the lower six inches of bowel before it enters the vagina. The greatest difficulty encountered in operating on such a case is to find sufficient and satisfactory voluntary muscle through which proper control may be obtained. A simple, external, anatomical restoration of the anus and rectum may still leave the patient incontinent. Again, although the remains of a sphincter may be found in the adult, it would seem to be of little value because it has never been used during life and therefore must be in an undeveloped condition, without proper nervous stimulation and surrounded by much fibrous and connective tissue. This however, is not the case, as the following operation shows. Sphincter fibers should always be sought out and used in the repair, however undeveloped or functionless they may seem.

If the opening into the vagina has been small and contracted for a number of years, varying degrees of distension of rectum and colon may be present as a further complication. This, accompanied by a bad malposition of the uterus (retroposition) may continually cause much difficulty and even inability to empty the lower bowel except by means of constant catharsis or enemata.

In May, 1909, a young woman 25 years old was referred to my clinic at the Free Hospital for Women by Dr. H. L. Langnecker, complaining of severe dysmenorrhœa and quite constant backache. An apparently healthy, normal, active woman, she had been following for some years her occupation as bookbinder. Had always been well as a child. Born in Scotland, no details of her birth could be obtained. The mother, although she knew of the absence of a proper anus soon after birth, had never mentioned the fact to her daughter as no symptoms had ever arisen to call attention to it. Until the patient was examined by Dr. Langnecker she was entirely ignorant of the presence of any malformation. All through life she had been constipated and always experienced great difficulty in evacuating the bowels although the sensation might be extremely urgent. When there was diarrhœa present, she noticed that she had but slight control unless she responded promptly. These symptoms, however, led to no suspicion of trouble.

Upon examination, the following condition was found: normally developed woman; external genitalia normal in every way. One was immediately struck by the entire absence of any trace of an anus. The labia closed normally and the skin back of the fourchette was normal in color and smooth except for the median ridge. There was no dimpling, puckering, or scar to suggest the location of an anus. On separating the labia, the vaginal introitus looked normal except for a slight break in continuity of the hymen posteriorly. By slightly everting the fourchette, there was seen posteriorly, just inside the hymen, an irregular opening in the posterior wall of the vagina. At the edge of this opening could be distinguished the bright red rectal mucosa as differentiated from the pale vaginal mucosa. On palpation, the opening admitted the forefinger easily and in an oblique direction led back into a normal feeling rectum. The tissues all seemed rather loose and there was no voluntary sphincter action. There

was no reddening or induration anywhere in this region. Hooking the forefinger in this opening, the perineum was palpated between the finger (in bowel) and the thumb (on the outside perineum). The perineum seemed about one inch thick and there could be distinctly palpated between thumb and finger an annular thickening lying in the perineal body under the skin but free from it. By inverting the perineum the tip of the thumb could feel the suggestion of an opening in this ringlike thickening. The diagnosis was made of a true, undeveloped, and somewhat fibrous sphincter lying free in the perineal body but connected in no way with either the skin or the bowel.

The pelvic examination showed a retroverted uterus, third degree, with an abnormally short posterior vaginal wall and shallow posterior vaginal fornix. The tubes and ovaries felt normal.

As the patient's symptoms were due entirely to the uterine malposition, operation was first performed for this trouble on May 11, 1909. Thorough dilatation and curettage, partial resection of right ovary for multiple cystic follicles, appendectomy, and suspension of uterus after Coffey's method. Uninterrupted recovery. It was noted at this operation that there had been no distension of the colon, sigmoid, or rectum and there was present no abdominal or pelvic abnormality.

In April, 1910, nearly a year after her previous operation, the patient appeared at my office to tell me that she had been entirely relieved of her dysmenorrhœa and backache by her previous operation and that she wished to enter a training school for nurses. Realizing her abnormal condition she wished to have the operation for restoration of the anus performed, so that in the future she need have no cause for anxiety. There had been no change during the year except that the bowels moved more freely after pressure of uterus was removed.

On April 11, 1910, the following procedure was carried out. Ether. Perineal position. Condition as described above. The end of the rectum was freed on all sides from its union with the vaginal mucous membrane and from the surrounding tissue for a distance of fully three inches, care being taken to destroy no muscle fibers. The end of rectum was caught and held by a clamp. A small linear opening was then made through the skin in the position of a normal anus. With the finger inside as a guide, a curved, blunt clamp was forced through the annular sphincter noted above. The freed end of the rectum was grasped with this clamp and brought down and out through this opening. No actual sphincter muscle was dissected out but the ringlike structure resembled in every way a true sphincter except for its inelasticity. The bowel was caught to this sphincter by four chromicized catgut sutures and the end of the bowel then carefully stitched to the skin by interrupted, fine linen sutures. The four catgut sutures acted as stays to prevent tension on the outside sutures. The opening in the posterior wall of the vagina was then closed and a good perineal body built up. Small rubber tube was left in the bowel to take care of gases, etc.

The opening through the rather unyielding, fibrous sphincter was purposely made very small, just admitting the little finger, for fear that if the sphincter should not develop a function, a too large opening would leave the patient incontinent.

Following the operation the patient was given nothing but liquids in small amounts for nine days. The rubber tube was removed the second day. On the ninth day 1 oz. castor oil was given by mouth and 8 oz. of sweet oil were given slowly per rectum through a small rubber catheter. The patient retained this oil for several hours and then gradually expelled it a little at a time with no pain and quite voluntarily. No fecal result. Diet increased.

On the tenth day the perineal stitches were removed, the vaginal closure having healed per primam. It was noted at this time that the new "anus" had retreated, was "drawn in" and quite resembled the normal. The linen sutures, union between bowel and skin having been established, were coming away.

The patient soon left the hospital still having great difficulty in evacuating the bowels on account of the small opening. For the next month she was given daily enemata. The finger was inserted as a dilator each time before the enema was given.

On May 31, 1910, the new anus still admitted the little finger with difficulty. The patient was given a few whiffs of ether and the sphincter well stretched until it admitted two fingers easily. At this examination the sphincter could be felt as a good sized muscle all the way around but thinner anteriorly.

June 20, 1910. Patient's bowels moving regularly with an enema and without pain. She left the city to take a position as waitress for the summer months.

On September 21st, five months and ten days after the operation, the patient was examined. General condition excellent. Bowels moving regularly without enema and with no pain. Has had perfect control at all times. Externally the anus appeared normal except that it was more deeply retracted. Patient now able to grasp the examining finger tightly with sphincter ani, showing the complete development of its voluntary function. Entered on her course in the training school.

It is interesting to note that a voluntary muscle such as the sphincter ani which had never functioned, could after 25 years develop its function so completely in the space of a few months. At the present time, March, 1911, the patient is in perfect health, and has normal control over the bowel movements.

A NEW METHOD OF TREATING THE STUMP IN APPENDECTOMIES

By JAMES T. GREELEY. M. D., Nashua, New Hampshire

THAT a ligated appendicular stump cannot be inverted, and that an inverted stump cannot be ligated, seem to have been accepted as axioms.

One or other of two principles, with various modifications, have therefore been followed by the profession.

The appendix has been ligated, cauterized, and dropped, an unsatisfactory method now becoming obsolete; or the appendix is ligated, amputated, and the stump buried within an artificial fold of the cecum, certainly not an ideal plan from any surgical point of view.

For a time the stump unligated was inverted within the bowel, but the occasional postoperative occurrence of serious hæmorrhage from the unligated stump so discredited this method that, as far as I can ascertain, it is now rarely employed.

The method which I am about to describe seems to me to offer a solution to this question.

The mesoappendix being taken care of in the usual way, the appendix itself is used as a handle, enough tension being exerted upon it to hold the cecal extremity in view, a fine cambric needle, threaded with fine linen or catgut is passed through all the intestinal walls at the appendicular base, and emerges again at a point about one-third of the distance around the appendicular base. The needle is again inserted through the opening just made or at a point close to its recent exit to take a second and similar stitch.

A third stitch of the same character brings the ligature out again at the point of original entrance or at a place adjacent thereto.

It is a modified purse string with this essential difference, the ligature lies either entirely or almost within the lumen of the appendicular base.

The loops at the two points of emergence are held in forceps, the appendix is next crushed and amputated and inverted into the triangle formed by the ligature within its lumen.

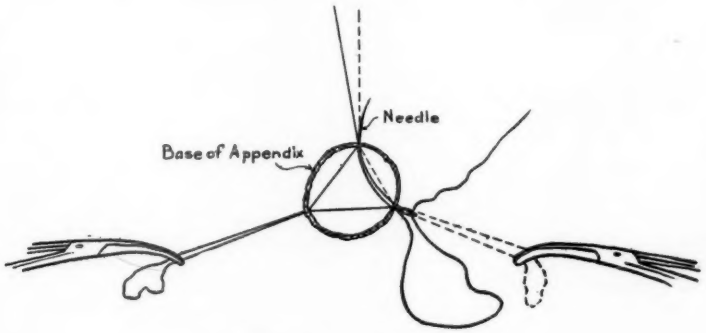
A slight tension on the ligature at the three points of emergence renders this step easy. The tucker yet holding the stump inverted, the ligature loops are gently loosened and the free ends tied.

The stump is inverted within the bowel, and it is ligated. A second row of Lambert sutures insures strength and covers any raw surfaces left at the mesoappendicular field of operation.

The objection to passing a ligature within the lumen of the appendicular base and out again may be well taken, but the same objection would hold in the case of any intestinal anastomotic work; with reasonable aseptic precautions I think this objection may be dismissed.

In a limited number of chronic and subacute cases I have employed the method thus described.

The results, operative and postoperative, have thus far been satisfactory.



Suture before Inversion

ARTIFICIAL SYNOVIAL FLUID[1]

By ROBERT T. MORRIS, A. M., M. D., New York City, New York
Professor of Surgery, New York Post Graduate Medical School

ON Saturday at my clinic you were shown a girl, eighteen years of age, who fell three months ago, injuring the left knee slightly, and giving since that time a history of chronic synovitis with thickening of the soft parts about the joint, and considerable fluid in the synovial cavity. There is local elevation of temperature, pain, and tenderness.

You were shown at the same time an aged stage driver who struck his right knee against a step six months ago. In his case there is apparently no increase of fluid in the synovial cavity, but the knee is painful, tender to the touch, and with local elevation of temperature.

Both of these cases represent common types of chronic synovitis which are very intractable to treatment, and the despair of physician and patient. According to old methods of treatment, rest, counterirritation, elastic pressure, the hot box, massage and other resources eventually gave relief, but often leaving irritating adhesions. It was in the adhesion class of cases some years ago that I planned to give relief by injecting an artificial synovial fluid, not only in the cases with adhesions following traumatic synovitis, but in those with adhesions following various infections, in selected cases. The adhesions were broken up, and the artificial synovial fluid injected.

The fluid was also employed for mechanical effect in the class of cases in which there was no history of acute inflammatory process, but where we had "dry creaky joints" of indefinite pathology.

It was my impression that the artificial synovial fluid made according to the first formula would have to be changed in many ways after experimentation, but as a matter of fact it has not only fulfilled its mission, but its range of employment has now been extended to cases of chronic synovitis in advance of the adhesion stage. It was my intention in making up the formula, to have a fluid similar to normal synovial fluid in physical characteristics, and this was obtained by mixing together one part of boroglyceride, three parts of glycerine, and four parts of water. In order to make the fluid benign and acceptable to the tissues, salt was added to make the solution isotonic with the blood serum of man, which is nine-tenths of one per cent; about four and one-third grains to the ounce. While boroglyceride is an antiseptic, and glycerine inhibits growth of bacteria, the fluid is sterilized by heat before injection into a joint. It was my impression that the fluid would remain in a joint cavity for a considerable period of time without absorption, because the hygroscopic glycerine would naturally attract moisture by osmosis toward itself. This proved not only to be true, but it was noted that the hygroscopic fluid incidentally unloaded interstitial infiltrates by osmosis from chronically inflamed structures about a joint, and gave prompt comfort in many cases of synovitis. This unexpected result has therefore extended the range from the adhesion group of cases in which I simply intended to give the mechanical effect of a lubricant, and has made it a valuable resource in cases in which unloading infiltrates by osmosis relieves intractable inflammation, which seems to be due in part to infiltrates present in the fibrous structures about a joint.

The artificial synovial fluid is injected into a joint through a rather large needle syringe and all sterilized by heat. If synovial fluid is already present in a joint in excess this is first aspirated out before injecting the artificial fluid. In the adhesion group of cases adhesions are first broken up while the patient is under an anæsthetic, and I formerly waited a week or so for the resulting inflammation to subside before introducing the artificial synovial fluid. This fluid, however, has given such prompt comfort that the period of time after breaking up adhesions is shortened, and in many cases injection is made immediately.

It was my impression at first that the patient should remain in bed for some days after the injection was made, in order to avoid undue inflammatory reaction, but so many patients have spoken of instantaneous comfort, and have wished to use their joints at once, that few are now kept in bed after the injection has been made.

The amount of fluid to inject will depend on one's judgment. A single drop will suffice for finger joints; in the knee we sometimes use more than an ounce. The length of time that the fluid resists absorption cannot be stated, because the class of patients in which the experiments were tried are for the most part of the sort who do not

[1] Report from a clinic at The New York Post Graduate Medical School, April 12, 1911.

return to the clinic or to the hospital readily after they are well. In some cases we have kept track of the patients for some months, and during that time no further injection was necessary. In other instances we have made a second injection, but not often. The second injection has been made chiefly in cases of shoulder joint adhesions broken up at the clinic, and patients allowed to go immediately after injections had been made.

For the most part artificial synovial fluid prevents the recurrence of adhesions after a single injection. Concerning the two patients forming the subject of my remarks to-day: the old stage driver was made immediately comfortable by the injection of thirty-five cubic centimeters of the artificial synovial fluid, and walked home yesterday, but failed to return to-day as he promised to do. That is because he is not interested in the scientific side of the question. Previously he has been coming very regularly to the clinic to receive treatment by counterirritation and splints. The girl we kept in bed because of the amount of fluid in the knee joint which could not be aspirated at the time of the injection, on account of its density, and thirty cubic centimeters of the artificial synovial fluid were injected in addition to the fluid already there. It is the first time that such a procedure has been tried. The effect at first was to cause considerable pain for a day; the pain then disappeared, also the chronic tenderness, and she tells us now that her knee joint feels comfortable for the first time since it was injured, three months ago, four days having elapsed since the injection of the fluid. I remember only one other case in which pain resulted from the injection of artificial synovial fluid. This was in a patient who had suffered from hysteria in many forms, and who had a firm ankylosis of one knee joint of unknown origin. Adhesions were broken up, artificial synovial fluid injected, and the patient complained of great pain afterward. Some weeks later adhesions had re-formed, injection was again made, and again pain was caused, although the patient was fairly comfortable at the end of two or three days. I do not know if there was recurrence of adhesion, as we lost track of this patient, and the treatment was unsatisfactory at last accounts. Pain after the injection is precisely what does not follow in most of the cases, and the promptness of comfort is notable.

It may be that later we shall experiment with injection of this artificial synovial fluid in cases of acute infections of the joints, but up to the present time we have used it only in adhesion cases, in cases of synovitis of the chronic type of traumatic origin, and in the "dry creaky joints" of indefinite pathology.

TRANSACTIONS OF SOCIETIES

CHICAGO SURGICAL SOCIETY

A Regular Meeting, Held March 3, 1911, with the President, Dr. Jacob Frank, in the Chair

EXHIBITION OF A TAG OF OMENTUM

Dr. Roger Vaughan: I have here a specimen which I desire to show for Dr. A. E. Halstead. It is a piece of omentum, which was taken from a left inguinal hernia, a diagnosis of omental hernia having been made because of the nodular feeling before the operation, and there was a point of tenderness, the cause of which was not particularly apparent until the operation was performed. At the operation it was practically impossible to tell the nature of it with the smooth peritoneal covering. It was thought by Dr. Halstead and myself to be a thrombosis of the varix and that it probably accounted for the tenderness. This specimen was taken up to the laboratory, was examined by a pathologist, the peritoneal covering stripped off, and we found this little glandlike looking body, with considerable hæmorrhage into it, and on cross-section it turned out to be a little fatty tag. Microscopic section showed it to be fat in that the nuclei do not stain, and around the borders of the tag there is considerable infiltration with blood. On stripping it up from the surrounding tissue we see at one end a little vessel entering it. Whether this is twisted or not, it is hard to say, looking at it with a hand lens. It is very small, but the presumption is that it was a floating tag of omentum, and the vessel has twisted and the fatty tag has undergone necrosis.

In looking over the literature I have not been able to find a case like this, although the records show a small bit of necrosis of the omentum, and, it seems to me, this affair ought to have some bearing on the etiology of twisting of the omentum which is so little understood now. Riedel holds that omental twists occur in connection with hernia; that every patient with an intra-abdominal torsion of the omentum has a hernia in which there has been an omental prolapse, and then, owing to trauma or some injurious influence, there have been little areas of papillitis develop, and these in some way, as pointed out by Riedel, bear a relation to the development of twist or torsion of the omentum. There is around this little tag of omentum an area of reaction. It is practically impossible to make it out now, but when the tissue was still fresh there was a distinct induration there, so that it did not seem to be due to edema. It is not easy to tell whether the twisting of the pedicle occurs as a primary process with reaction around the fatty tag, or whether the process of papillitis was primary, and whether that would produce a hæmorrhagic infarction of the little tag I cannot say. The omentum was not adherent to anything. According to most authors who have written on twisted omentum, it is necessary that there should be adhesion in some way, usually at the inguinal ring, and there are some who hold that in order for omental torsion to take place there must be two adhesions. Here the omentum was perfectly free.

Dr. Charles O'Byrne (St. Luke's Hospital): Dr. Le Count and I have studied this material in connection with an examination of the gross specimen, and from the histological slides it appears the following processes have followed each other in the following order: First, appendicitis in the distal end of the appendix, followed by perforation of the mesenteric side, fatty portion. This perforation was then covered by inflammatory connective tissue proliferation, which has caused this ball valve formed on the end of the appendix, and then a pus cavity at the point of perforation which emptied into the lumen of the appendix. Now, on the cut surface we have a picture something like this (indicating on the blackboard): In the region of the appendix we have a muscular band which is quite markedly outlined here on the cut surface and is glistening, and then this muscular band of the bowel lining which terminates here, as does also the muscle wall. But here we have continuous with the bowel lining adenoid tissue and epithelial cells, showing where the perforation took place. This is all connective tissue proliferation of inflammatory origin and is greatest in amount toward the mesenteric attachment.

Dr. Harsha: What does the section show?

DR. O'BYRNE: The larger amount of the tissue is connective tissue.

DR. HARSHA: Is there any sign whatever of malignancy?

DR. O'BYRNE: No.

TESTING THE VIABILITY OF STRANGULATED INTESTINE

DR. SAMUEL C. PLUMMER read this paper which appears in this issue. (See p. 528.)

DISCUSSION

DR. A. J. OCHSNER: Dr. Plummer has given us something that is worth while. The idea is so reasonable that if one considers the condition that one finds in strangulated hernia, it is strange it has not been brought out before, or if it has been brought out before, so little has been made of it, and I for one have not encountered it. In strangulated hernia the danger of a resection is really very great. In a case like the one Dr. Plummer has described, unless you make a long resection and go quite beyond the communicating branches of the mesenteric vessels in your anastomosis, you are likely to have some necrosis and have a fecal fistula. At any rate, in a case of several days' standing in which a resection is done, I should always make use of drainage afterwards because of the great danger of progressive thrombosis. In many of these cases the vessels of the proximal segment become thrombosed afterwards, and you have a slough that extends along the proximal segment, so that the rule I have followed has been to make an excision of the diseased portion, and then make an anastomosis at least twelve inches above the lower end of the upper segment.

What Dr. Plummer has told us explains why cases that seem practically hopeless still recover. I have personally always gone by this rule, that whenever it was not certain that the intestine was gangrenous, I have always replaced it. Some surgeons leave the intestine out when there is any doubt as to the vitality and replace it only in cases in which there is no doubt about its vitality. The rule I have followed has been exactly the opposite. Wherever I have not been able to find certain destruction of the intestine, I have replaced it and have had but one case in which later on I have found necrosis of the intestine, with an adhesion surrounded by omentum, and with a fistula emptying out through the inguinal canal, necessitating later on a resection. Of course, that is a personal matter. One man would be in doubt about a thing of that kind, while another man would not be in doubt, so that each man must make his own rule from his own observations in these cases. But Dr. Plummer has given us a method which is so much more reasonable than the one we have used heretofore, that I believe it will stand.

DR. WILLIAM M. HARSHA: I agree with Dr. Ochsner that Dr. Plummer has brought before us a method that is of value. Within a few weeks I have had occasion to see a case in association with Dr. Steele of strangulated femoral hernia, that illustrated the point that the strangulation was in part due to the traction. There was a little loop three inches long, and we found when we got the tension off it would recover, without completely replacing in the abdomen, and when traction was again made the intestine grew dark. We felt satisfied that with the traction off we could get complete recovery of the entire loop. It was replaced and the patient recovered.

I have used temporary replacement in umbilical hernia with recovery of color in one case. In other cases which did not recover the color, I had to leave the intestine out and open it, or do resection. But in thinking over the femoral variety, where it is not desirable to make any larger opening than possible, it occurred to me that one could replace a loop if we could recover it again, and I thought of the device of applying a heavy silk ligature, passing it through the mesentery and putting the loop of intestine back into the abdomen and permitting it to stay for ten minutes, and with the large thread withdraw it again for examination without enlarging the opening. I have not tried that, but have thought of it in connection with one or two cases I have had, and I think it would be worth while to try it in cases of femoral hernia in which you do not want to enlarge the opening beyond reasonable limits, and where it might be difficult to withdraw the loop if passed into the abdomen without a guy rope.

THE SURGICAL ASPECT OF PYLORIC STENOSIS OF INFANTS, WITH A REPORT OF SEVEN CASES

DR H. M. RICHTER read this paper which is published in this number. (See p. 568.)

DISCUSSION

DR. FRANK X. WALLS: Mr. President and members of the Chicago Surgical Society: Dr. Richter has told you pretty nearly everything I think may be said about this subject. It is interesting what he said about the frequency of pyloric stenosis to-day. The first mention of pyloric stenosis as a disease dates probably from Hirschsprung's paper in 1861, he being the first to recognize the condition as one of

any clinical significance. It is only since 1892 that the disease has been considered surgical in any sense, and it is probable that until Scudder's paper, read before the Chicago Medical Society in 1905, our attention has not been directed at all to the disease. Since our attention is called to this disease, we see a large number of cases that present this symptom-complex. Personally I have seen twenty-three cases that had this pyloric condition. I know of no symptom-complex which is so striking as this. The children usually are born of healthy parents, so far as we know. The only thing that may be mentioned about heredity is frequently we have in our cases more than one child of the same parents afflicted with this disease. I have known in two families of two children who had this condition, but apart from that little point of heredity the children are perfectly normal when they are born. Usually the children get along very nicely for a few weeks. There is no evidence at this time of any stomach disorder. They do not vomit. They have good bowel movements. They gain considerable in weight. That is the rule. There is a short interval of good health, and usually, somewhere in the first month, the condition appears in over one-half of the cases. With probably few exceptions, in my cases all within the first month began to vomit. That vomiting was considered, at first, to be due to the taking of food that was not suitable for them, and usually the mothers nursing the babies have been given other food, but the symptom has persisted despite any dietetic regulations that may be made, and usually it is for the persistent vomiting, with the consequent symptoms that may follow it, that the babies come to the physician. Granting that a baby comes with that history of vomiting, persistent vomiting, which has been going on for some days or weeks, and it occurs to one that it possibly may be due to a pyloric condition, examination will usually clear up the question, particularly if the case has been going on for a week or weeks. The condition depends, as Dr. Richter has said, upon a constricting band around the pylorus. It narrows the orifice of the pylorus so that the food cannot go through the pylorus as freely as it normally should, or in some cases it can hardly go through at all, and the food, because it cannot pass through the pylorus remains in the stomach and is voided either immediately after it is taken, or in a few moments' time, or vomiting may occur after two meals or three meals have been taken, and sometimes as much as fourteen ounces have come from a baby in that time which is only three months of age. This amount would equal many feedings, it having been retained in the stomach all of that time. The stomach dilates materially. It is easy to measure the line of dilatation in the stomach, and in examining these babies we have recourse for therapeutic and diagnostic purposes to the stomach tube, and there is nothing better than the stomach tube for the location of the stomach, and in passing a small soft catheter one can feel this catheter through the abdominal wall, usually following the lower curvature of the stomach, so that one can determine the stomach is well below the umbilicus, so that dilatation of the stomach is usually present and easily determined. The pyloric stricture does not allow the food to go through in sufficient amount, and in addition to the symptoms Dr. Richter has mentioned, one which has been of great importance and value in these cases has been the question of the amount of urine which these children have passed. The question of constipation is sometimes a little difficult to determine. So many mothers may not be able to tell you whether the babies pass a large stool, whether the stool is hard, or what its character may be. They usually will be able to tell you about the urine, or at least, give you some pointers of value. In these cases, particularly the severer cases, there is little fluid which goes out of the stomach into the small bowel. In consequence there is little fluid taken into the body, and there is little fluid itself that is passed through the urine, so that in some cases the mothers have told us, without making any inquiry, the urine was sandy, and that has been a symptom indicative of stricture or of occlusion of the pylorus, because there is almost no water taken up from the stomach. It must go into the small bowel before an appreciable amount is absorbed. Those symptoms that have been mentioned depend upon a stricture of the pylorus, the vomiting, the lessened amount of food going through the pylorus, with the small stool, with the little urine, and on clinical examination there is emaciation, which is marked, the dilatation of the stomach with its visible gastric peristalsis, and in these cases at all severe the use of palpation disclosing a pyloric tumor, will leave little wanting to arrive at a positive diagnosis in almost all of these cases, and in many of them at a single examination. Some of them require probably several days of observation, but usually at a single examination the pyloric syndrome is so marked that the cases can be recognized.

From a medical point of view the question of treatment is of considerable interest. Of the twenty-three cases that have come under my observation, fourteen have been operated upon, because I believe in those fourteen cases medical treatment would have been of no avail, and of these fourteen cases twelve recovered, which is a very small mortality, considering that all of these cases were more or less starved, and I think the two that died were in very poor condition when they were submitted to this severe operation. Of the nine cases that were not operated upon, three died while being treated by a number of physicians under different methods. They went on to progressive starvation. I have seen three cases recover in which I feel reasonably certain that the diagnosis of pyloric stenosis was correct, that were not operated upon. I have at the present time under observation the case of a baby of eight weeks who has been vomiting for three weeks, who gave the usual history of being well at first, and then gained in weight a pound within the first week, and then there was an arrest in gain, and then a failure in weight. But within the last week under treatment the baby has begun to grow again, and that case has a dilated stomach, and a visible gastric peristalsis. The baby has had no bowel movements except when medicines were administered, but that baby passed urine, at all times, freely, and no pyloric tumor could be palpated in that case. It looked as though this little patient might get well without being submitted to surgical intervention; but it has been my experience in that perhaps three-quarters or more of the cases I have considered as pyloric stenosis,—in at least seventy-five per cent of them I would consider surgical intervention desirable, if not absolutely necessary. In a large number of cases where a definite diagnosis is made, particularly where a pyloric tumor can be palpated, I feel in those cases the mortality would be nearly one hundred per cent by any method of medical treatment, and when medical treatment is mentioned one feels like apologizing for using the term, for it means nothing. Medical treatment according to Heubner is so different from the medical treatment of Huxmann. Their treatment is absolutely at variance with each other, one suggesting feeding babies every few minutes, the other allowing the babies to have three or four feedings a day, one giving large amounts, the other small amounts, some depending upon antispasmodics and local external treatments, and washing out the stomach. Some authors say that washing out the stomach is harmful, and so it goes with the medical treatment. There is no uniformity of advice. Then, too, it is claimed by those who have put medical treatment into practice that it is more advantageous than surgical treatment. The medical treatment must be carried out according to these observers for months, with the baby under constant observation, usually in a hospital, or where it may be seen almost daily, and after months one feels he has only overcome in part according to these observers the pyloric syndrome; whereas in the surgical cases, particularly those operated on by Dr. Richter, the condition is changed immediately from one of starvation, or from a condition where the baby was threatened with death by starvation, to one in which the baby could grow, as these babies have done, and have gained two or three ounces a day.

Another point in favor of surgical interference in these cases is that most of these babies develop this condition early, while on the mother's breast, and independently of taking of food, and when the food is thought to be at fault the babies are taken from the best food any baby could get, namely, mother's milk, and if the case is treated medically mother's milk is lost; whereas, after a surgical operation the baby can continue to nurse. In two recent cases we were able to have the mothers continue nursing the babies immediately after operation, and these babies have grown very satisfactorily, so that I rather think that this disease is a very common one, the more so since my attention was called to the condition and looking for a tumor I find the disease to be a very frequent one. Then, I think the condition, if recognized early and treated by surgical measures, will be followed by recovery in eighty per cent of the cases. The disease is one in which the physician, as soon as he realizes the nature of the case, should ask the assistance of a surgeon as to whether such an operation could not readily be performed.

Dr. Coleman G. Buford: Dr. Richter certainly has had an unusual experience. Although I have had much to do with the surgery of infancy, I have had the opportunity of operating upon only two children suffering from pyloric stenosis.

Dr. Richter has dealt with the theories of etiology but none of these apply in my cases. I could see no reason why we should have had a hypertrophic pylorus in either case; there was no ulcer present; there was no lesion of any kind in the stomach to invite spasticity of the pyloric ring and consequent hypertrophy.

The frequency of this condition has been spoken of; I have no doubt but that many of the children who die supposedly of chronic indigestion or gastritis are really children who have had pyloric obstruction. If we were to carefully look over such cases in the children's ward of our hospitals, I believe we would find more of these cases.

The obstructions in my cases were so marked that I could barely introduce a small probe through the pyloruses. Microscopic sections from each pylorus show immense hypertrophy of the muscle fibers. The gross pathology of one was simply a tumor near the size of a half dollar; it was palpable through the abdomen. The other tumor was not quite so thick. Both tumors looked exactly like cartilage. The larger tumor was two-fifths to three-fourths of an inch in diameter from the anterior surface of the tumor down to the pyloric lumen. The other tumor was perhaps one-third the diameter of this one, and was barely palpable before operation.

The peristaltic waves in each began at the cardiac end of the stomach and could be seen to travel from left to right, and as they did so, the stomach ordinarily dilated widely behind the waves, but on certain occasions, when the child was about to vomit, one did not see the stomach wall rise behind the contraction wave, but it remained spastic or contracted in its entirety so that when the waves reached the pylorus, there being no outlet for the food and no space in the stomach at this time, there was regurgitation. In one of my cases the nurses and interne had not seen the pyloric wave at all. The diagnosis was made by one of my staff colleagues and I knew it was correct; I therefore expected to see at once the waves of peristalsis upon stripping the child; but after waiting several minutes no wave was visible, when upon running my finger across the epigastrium a wave immediately started, followed by a series of marked peristaltic waves.

One especially important surgical point was brought out by Dr. Richter. "If the obstruction is permanent one should operate"; but how can we determine the question of permanency? To a certain extent we can do this through the size of the tumor. In proportion to the size of the tumor are we likely to have stenosis of the pylorus, and consequently more rapid starvation than in cases in which the tumor is smaller?

The mortality as refers to hospital and home treated cases, as brought out by Dr. Richter's quotations from literature, is interesting. It seems to me the private cases of Dr. Hutchinson received better attention than the hospital cases. In other words, I should be inclined to think that a man of Dr. Hutchinson's experience would recognize more of these cases in his private practice and when recognized direct them with more care than is usual and would manage them better than he could do in hospital practice.

I think the anæsthetic is a great factor in the causation of death. The patient is already reduced and through ether intoxication his chances are lessened. Prolonged operation is another factor in the mortality.

As to the choice of operation, I have learned one thing, namely, never to do an anterior pyloroplasty again. I was not satisfied with the first one I did in which I made a Y-shaped incision. In this case I made an anterior incision and found the tissues so intensely cartilaginous that I could do almost nothing with them, yet I finally succeeded in uniting the tissues as I had intended but could not secure peritoneum with which to cover the cut surface. I sewed from the surface down to the mucous membrane; I was compelled to leave the wound unprotected by peritoneum, but this patient recovered in spite of it. I do not believe in the operation of divulsion. I would not again use anterior pyloroplasty because I do not believe the tissues involved in any of these cases are sufficiently pliable to certainly allow of that operation, and at the same time to give a good free opening. In my last case, incised in a linear way on the anterior surface of the pylorus, the tissues were far more pliable than in the first, in which I did get a latent pylorus; but on sewing up the anterior incision by the method of transforming the longitudinal incision into a transverse one, I found a kink at the pylorus on two occasions and had to take out the stitches and whip the tissues about in such a way as to finally obtain a patent pylorus.

I fancy we will do better and faster work if we resect the tumor and perform a duodenogastric anastomosis rather than do a pyloroplasty or a gastroenterostomy. The freedom of the child's pylorus and the tumor make resection very easy and I fancy that I could effect union of these parts by suture more rapidly than through other plastic operations. Time is a great factor in this work.

Dr. William Fuller: I would like to ask Dr. Richter to say a word in his closing remarks about the technical difficulties of gastroenterostomy in the child or infant as compared with the same operation in the adult.

DR. A. J. OCHSNER: There is no doubt but what the exposition Dr. Richter has made is a good one. If, in these cases of pyloric obstruction, the tissues are not traumatized unreasonably, that is, if you are not naturally violent in your surgical technique, a large percentage of these children so operated recover. A posterior gastroenterostomy is so simple and requires so little manipulation that these patients ought to recover.

The suggestion that Dr. Walls makes regarding the introduction of a catheter through the mouth into the stomach and through the enlarged pylorus, after the manner Dr. Richter has described, is certainly worthy of trial.

DR. RICHTER (closing the discussion): In the first place, I wish to thank the various gentlemen for their free discussion of my paper.

Regarding the suggestion of Dr. Buford to do a pylorectomy, the mortality to-day from this operation is said to be one hundred per cent, and I really feel that as the obstructing tumor is not a source of danger, and we can overcome the obstruction, it would be better not to do that operation.

Dr. Lewis has brought up the subject of the effect on metabolism of posterior gastrojejunostomy. The question has been brought up by internists as to whether or not this operation in some way does not have some effect on digestion in shunting the food from the stomach into the jejunum. It seems to me, that so much experimental work has been done along this line that we can answer positively that there is no measurable effect on metabolism. I think we know definitely just how far down the small bowel we may expect to be able to make an anastomosis without definitely interfering with normal intestinal digestion. When an anastomosis is made between the stomach and small bowel of a dog at a distance of thirty-five or forty centimeters from the pylorus, the dog definitely shows the bad effects having origin in the altered digestion. It is likely that food must pass through some part of the upper alimentary tract, some part of the duodenum and jejunum, to stimulate in its peculiar way the secretion of certain necessary elements which are formed in the upper part of the bowel, but when that shunting is between the stomach and part of the bowel, high up, in the upper part of the jejunum, there is no effect that can be measured on the dog, and there is no effect that has been measured on the human being. Several of these babies have been studied after the performance of posterior gastrojejunostomy, and elaborate experiments have been carried on with reference to the digestion of the various food elements and no effect has been discovered. On that score alone, it seems to me, we can state we note no ulterior effect. Dr. S. A. Matthews has done a considerable amount of work on the subject, It seems to me, we need have no fear as to the ulterior effects from shunting food into the jejunum. So far as secondary jejunal ulcers are concerned, that is a different problem. That is answered in favor of doing a posterior gastrojejunostomy. In the child the formation of jejunal ulcers is almost done away with to-day. So called vicious circle vomiting is really due to intestinal obstruction.

Regarding Dr. Ochsner's remarks on the subject of passing a catheter into the jejunum, I wish to say a word or two. Within the last two weeks I operated upon a child eight days of age that had intestinal obstruction of congenital origin. The obstruction was in the duodenum just at the point of entrance of the common duct. The obstruction was due to fusion of the peritoneal layers, forming something like a retroperitoneal hernia, and after straightening it out, the bowel was so small that I did not know whether I might not have complete obstruction due to a diaphragm or maldevelopment. I thought of Dr. Walls' suggestion, and passed a catheter down into the stomach, and with the abdomen opened, I passed it on through the pylorus, through the duodenum and into the jejunum, and while I had it there I poured three or four ounces of normal salt solution into the jejunum, and saw the small bowel fill out. A nice thing to do, after doing this posterior gastrojejunostomy, would be to pass a catheter through the stomach and through the opening made at the time of the operation, pass it on into the jejunum, and then pass three or four ounces of normal salt solution through the bowel at the time. As these patients have been losing two or three ounces in weight a day, they need water more than anything else.

As to the technique, I use the typical posterior gastrojejunostomy, bringing the jejunum in contact with the stomach wall. I have not felt that any material difference is to be expected from placing the bowel in any particular relation to the posterior stomach wall. The Mayos claim that we should attach the jejunum to the stomach in such a way that it tends to leave the posterior stomach wall in the direction toward the left flank, and Monyihan has felt that the reverse is true. So I have not tried to determine for my own self which is the better method. I will say this, however, I do believe in this work it is better to

use instruments that are better adapted for small work, and particularly the suture material should be adapted to this work. Personally, I use a very fine cambric needle and fine silk. I use a number nine or ten cambric needle, and use size A ordinary twisted silk. It is perfectly strong, and we won't get the seepage effect of a coarse suture. In the first patient upon which I operated I used ordinary suture material, and the patient developed symptoms of intestinal obstruction two or three weeks after the operation. I reopened the abdomen and found extensive peritoneal adhesions, and I am sure these extensive adhesions were not due to my manipulations, because I operated rapidly in that case, and I did not have occasion to handle the intestines very much, but the adhesions were due to seepage from the thick coarse suture material.

The last baby I operated on January twenty-seventh, did very well for four or five days, then developed an acute intestinal obstruction. I opened the abdomen. I found volvulus of the entire small bowel from the line of suture at the gastrojejunal junction down to the ileocecal junction. The entire small bowel made a twist between one-half and a complete circle on itself. I rapidly undid the twist, and found it actually impossible to get the intestines back into the abdomen. I thought of Dr. Walls' suggestion in this case. I passed a catheter down the gullet through the stomach, through the opening I made before, and emptied the greater part of the small bowel backward; got rid of the overdistension and easily replaced the bowel. This method of passing a catheter down the stomach and into the small bowel is feasible in connection with this work, and it will be of some use.

CHICAGO SURGICAL SOCIETY

A Regular Meeting was Held April 7, 1911, with the President, Dr. Jacob Frank, in the Chair

DISLOCATION OF THE SCAPHOID

Dr. Charles Davison showed a patient, a man from the County Hospital, who had sustained a dislocation of the scaphoid. The patient was going down stairs, missed a step and fell two or three steps on his outstretched left hand. Just why the scaphoid was dislocated rather than a Colles' fracture produced, he could not understand. At the time of the accident the deformity was more suggestive of a Colles' fracture than now. The swelling was greater. The case was diagnosed as a Colles' fracture at first, but X-ray examination showed it to be a dislocation of the scaphoid.

Dr. Frederick A. Besley said it was a question in his mind whether it was a scaphoid or semilunar dislocation. The other day, when he examined the case, the scaphoid seemed to be in position.

Dr. Davison said there were only two X-ray plates of the case, one of which showed distinctly that the scaphoid was gone.

CONGENITAL STENOSIS OF THE URETER

Dr. Daniel N. Eisendrath read a paper on this subject which appears in this issue. (See p. 533.)

DISCUSSION

Dr. Coleman G. Buford: We have these meetings for the purpose of exchanging experiences and learning from one another. I have had a little experience in work of this character It was largely in the service of the late Dr. Fenger. We all know that Dr. Fenger did a great deal of renal and ureteral work. One of these cases came under my observation when I was with him. It was a case of unquestioned congenital stenosis of the ureter. The patient had moderate attacks of pain for a few years, and when about eighteen years of age developed a large tumor in one side, which was present intermittently. Dr. Fenger and myself each endeavored to catheterize the ureters through a Kelly cystoscope, and failed. Dr. Fenger made a diagnosis before operation of hydronephrosis. Of course, whether it was congenital or not, we could not make out, but we assumed that it was a congenital defect because of there being no history of passing stones and none being found in the kidney. Upon operating, the obstruction was found at the uretero-pelvic junction. Dr. Fenger made a plastic operation upon this, simply incising the stenotic area longitudinally and united it transversely.

This case was interesting and Dr. Fenger had the notes of it on his table and was going to work it up and present it at one of our meetings, but he died before he finished the preparation of this paper. The case was interesting, because he had succeeded in establishing an opening, and this

was proven by numerous injections of methylene blue into the renal sinus. This fluid passed out into the bladder.

The hydronephrotic sac was an enormous one, holding two or three quarts of fluid. We took microscopic sections from the thinned out cortex, and these showed a great deal of good, healthy secreting structure which upheld the theory that Fenger supported to the very last, namely, that in hydronephrotic kidneys the organ must not always be sacrificed in contradistinction to what was popular at that time, that when a hydronephrotic kidney was found it was excised. "These kidneys," he said, "are almost invariably useful, and one can not tell how much kidney tissue is present until a volumetric test of urine is made or a microscopic section examined." We found, by weighing gauze dressings saturated with urine, that every twenty-four hours the kidney secreted about eleven ounces. This tended to prove the value of the kidney to a certain extent. We do not know how much passed through the ureter to the bladder. This particular kidney was worth trying to save. The case is of further interest because a few months later, a urinary fistula being yet present, Dr. Fenger reopened the kidney, assuming that he could make the outlet of the pelvis of the kidney which had become obliterated, again patent, by another operation similar to the first, and thereby get the sinus in the lumbar region to close. At the first operation the kidney was of enormous size, a thinned out sac, but the second operation found the kidney contracted into a reasonably solid mass, not showing externally the contour of a kidney, but on sectioning it there were some signs of it being a kidney. For instance, the calices were most distinct and the cortex was recognizable. He divided these calices to prevent further sacculation and made another operation similar to the first one; later this case became infected. After it became infected the patient ran a high temperature for a long time. She was very sick. Ultimately we had to take out the kidney. Before we took it out there was no secreting tissue that amounted to anything as was proven by the scanty flow of urine from the renal sinus. We were reasonably sure there was no urine passing to the bladder. After the infection the kidney had been transformed into an immense mass of cicatricial tissue, the secreting substance having been obliterated by contraction. This is one example of what infection will do to such a kidney as this. After Dr. Fenger's death, the patient came under my care, having developed hydronephrosis on the other side. Ureteral catheterization, now possible, showed that the stenosis on this side was near the bladder, perhaps next to the bladder. Dr. Favill examined the patient, and on one occasion, while he was examining her could feel the tumor and partly emptied its contents into the bladder, tending to prove there was a hydronephrotic kidney on that side. Operation was refused, and the patient died about two years later, I understand, from uremia.

I do not know how many cases of this type Dr. Fenger operated successfully during the time I was with him, but he was successful in several scattered here and there.

Another case, from Jacksonville, was operated on in the same manner as the first, but he failed to accomplish anything and did a nephrectomy a short time afterwards.

Dr. Wm. E. Morgan operated on a patient which came under my observation in his service at the Mercy Hospital, showing stenosis at the lower end of the ureter about its junction with the bladder. Fenger assumed that he could do nothing extraperitoneally for patients showing stenosis in the lower third of the ureter. Dr. Morgan made a diagnosis of stenosis situated low down. He went in extraperitoneally and succeeded in exposing and repairing the defect in the ureter by plastic methods. The patient, a boy, was very much emaciated when admitted to the hospital, but in about four months thereafter he was a healthy looking young man.

DR. FRANK: What was the method of repair?

DR. BUFORD: Dr. Morgan, in this case, made a longitudinal section and transverse suture. I think we can do more uretrovesical anastomoses in operating on this type of cases than we have heretofore thought. For instance, about two years ago I tied off a ureter in doing a hysterectomy. It was the first and only accident of this kind in my experience. About six or eight weeks later I operated through my first incision, invading the original field in which the urine was now retained, as it leaked from this ureter; the overflow welled out of a fistula in the abdominal incision. The Trendelenburg position was used. I found, as I knew I would find, a walled off pocket there. Of course the intestines lay about above it, and the bladder below it. I went above the broad ligament and tried to dig out the ureter from beneath it but could not, everything being infiltrated and friable. I cut off the ureter above the broad ligament, loosened up the ureter, and implanted it into the bladder and inverted the cut edges of the bladder into the bladder itself. A further leak lasted only a week or ten days.

I have no way of estimating the length of the ureteral section removed, but it was longer than the resection we read about as being made with reasonable ease. Shortly after that a young man from one of the South Atlantic States, reported just such an experience, where he had also made a cupola in the bladder, by pushing it upward with a sound to meet the ureter, and had a good result as I did.

DR. EISENDRATH (closing the discussion): I am familiar with the work of Dr. Fenger, and I tried in every way in this first case, a boy of fourteen, to think of some manner in which I could save the kidney. I palpated along the ureter, the ureter was enormously dilated, and I could easily run my finger up in either direction, and palpate up and down. I palpated up towards the kidney and found, as the illustration shows, it was quite narrow at that point. I reasoned this way: if we could get rid of the infection in the ureter, I might be able, as Dr. Buford has mentioned here, to implant this lower end of the dilated ureter into the bladder at some point in the manner in which he has mentioned. I thought of doing that, or else possibly I might be able, if this ureter (indicating on the blackboard) did not reach down as far as the bladder, to introduce some intermediate substance, and I thought of utilizing the saphenous vein. We made preparation to do the operation of taking out the saphenous vein in the boy, and ligating all branches we could find and using them and suturing it from the lower end of the dilated ureter into the bladder. But when this infection occurred we could not do that. Since that time, in talking over the matter with Dr. Allen, who is associated with Dr. Matas, New Orleans, he told me that it would have been perfectly useless to try the saphenous vein as a substitute for the ureter. He said that this had been tried and the vein walls will not stand the constant action of the urine. They will undergo necrosis and will be useless. He suggested that we could try in some future case the use of the Fallopian tube, so this winter, with the assistance of Dr. S. A. Mathews of the Physiological Laboratory of the University of Chicago, we made experiments on dogs, and we found the only dogs which were suitable were young non-impregnated dogs, where we took the Fallopian tube and tried the experiment only once, but we watched the result in this case and found it was not a success. We resected an inch of the ureter and put the Fallopian tube from the dog in and sutured it in the usual way into that segment of the ureter, but we found the mucous membrane was not very much affected, but that gradually there developed at both of these ends stenosis, resulting in enormous hydronephrosis, and I believe that has been the usual experience in this Fallopian tube work as a substitute for the ureter. Dr. Joseph Davis in an article in Bruns Beitrage fur Klinische Chirurgie speaks of some work having been done in one of the German clinics of trying to utilize the Fallopian tube as a substitute for the ureter, and with the same unsatisfactory result. That was our experience in the first case. We felt that Dr. Fenger's work was valuable, and that as long as there was a bit of secreting tissue left in the kidney we should make a plastic operation with a view to saving the kidney. The same thing occurred last Friday in this case, when I had the kidney exposed, brought it out on the surface of the abdomen and studied the whole thing, and took my time to see what we could do, I thought of saving this, but this boy had infection, the urine contained a large amount of pus, and the fluid which came from the tumor was very turbid and contained a large number of blood corpuscles, and that was an important factor in this case. The other factor is with reference to nephrectomy. With the exception in the upper pole here in this kidney there was scarcely more than tissue-paper thickness of kidney tissue left to secrete, so I felt under these circumstances that a plastic operation was out of the question.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

FREDERIC A. BESLEY, M. D.

GEORGE E. BEILBY, M. D.	WM. R. CUBBINS, M. D.	AIMÉ PAUL HEINECK, M. D.
J. S. EISENSTAEDT, M. D.	FREDERICK G. DYAS, M. D.	G. T. COURTENAY, M. D.
FRED C. ZAPFFE, M. D.	JAMES F. CHURCHILL, M. D.	B. J. O'NEILL, M. D.
ARTHUR B. EUSTACE, M. D.	JOHN A. WOLFER, M. D.	H. A. POTTS, M. D.

Torsion of the Great Omentum (Ueber die Torsion des grossen Netzos). DR. H. FINSTERER. *Beiträge zur Klin. Chir.*, band lxviii, heft 2, p. 521.

In spite of the development of abdominal surgery, torsion of the omentum is still of rare occurrence, compared with the twisted pedicle of other organs, such as the ovary. Pretsch, in 1906, was able to collect but 44 cases, since which time the number has been increased to 72. This writer classifies these cases into three varieties, viz.:

1. Twisting of the whole omentum or parts thereof without the previous existence of adhesions.
2. Twisting of the whole omentum or part thereof between two fixed points.
3. Complicated atypical cases of torsion.

As it has been found that torsion of the omentum not infrequently occurs associated with a pre-existing hernia, Payr has made the following classification:

1. Torsion without coexisting hernia.
   a. Simple cases involving the omentum only.
   b. Complicated cases involving other adherent abdominal organs.
2. Torsion with pre-existing hernia.
   a. Intra-abdominal torsion without involvement of the hernia.
   b. Intra-abdominal torsion with involvement of the hernia (strangulation, inflammation).
   c. Omental torsion within the hernial sac only.
   d. Complicated cases:
      (1) Both intra-abdominal and hernial twisting.
      (2) Either intrahernial or intra-abdominal torsion associated with a retrograde incarceration.

As to the etiology of the twisting, some unusual effort of the abdominal muscles, acting upon an already enlarged or adherent omentum, may be the cause as well as increased peristaltic action.

The symptoms frequently simulate other acute abdominal conditions such as volvulus and appendicitis. There is a sudden onset with pain, nausea or vomiting, constipation, tenderness, rigidity, etc. It is significant if there are signs of acute trouble in a coexisting hernia, but all of the above symptoms could be simulated by a strangulated hernia alone. In the cases reported, the diagnosis was generally not made before opening the abdomen. Whenever it was made, however, it was based on the finding of a tender mass in the abdomen, or there was also some connection with a hernia. Even though the previous history disclosed the existence of gastric symptoms, due to dragging on the stomach by a chronically inflamed omentum, these might be similar to those produced by chronic gall-bladder or appendical trouble.

The mortality, which has been 14 per cent, should be reduced by early diagnosis and timely operation. As to the operation, it should consist in ablation of the strangulated mass, and not in merely untwisting, as has been advised. To leave chronically inflamed, enlarged thrombosed omental masses within the abdomen is very likely to be followed, sooner or later, by serious complications.

The author adds an interesting case of his own and furnishes a compilation of the literature.

WILLIAM HESSERT.

Plastic Operation on Chin in Micrognathia (Transplantation of Rib) [Kinnbildung bei Mikrognathie (Rippentransplantation)]. DR. ESAU. *Zentral. f. Chir.*, 1910, xxxvii, 1636.

Micrognathia (vogelgesichtes) "birdsface," requires two operations for correction. One for the redressment of the ankylosis of temporomaxillary joint and the other for the enlargement of the jaw in sagittal and longitudinal direction.

Case. Eighteen year old girl had chronic lockjaw with resulting smallness of lower jaw. First a removal of the ankylosed joints was performed with the interposition of the temporal fascia. Three weeks later resection of 12 cm. of eighth rib on right side. From a small incision in the lower jaw the skin was undermined upwards and laterally, the point of the chin sawed through and the angulated portion of rib inserted between the separated fragments of maxilla. Patient made an uneventful recovery, can open jaws easily and is well satisfied. Early age is best time for such operations.

FREDERICK G. DYAS.

The Diagnosis of Injuries to the Spleen (Zur Diagnose der Milzverletzungen). DR. LORENZ LEVY. *Zentralb. f. Chir.*, 1910, vol. l, 1577.

Levy reports history of man falling upon abdomen and having pain, nausea, vomiting, and tenderness in splenic region, with pain radiating to left scapula. This was accompanied by abdominal distension. The patient complained chiefly of the pain in the left shoulder. Laparotomy confirmed the diagnosis of ruptured spleen. Levy compares the left shoulder pain to the pain in the right shoulder in liver abscess, and explains it upon the connection of the splenic nerve with the 4th cervical root. The author emphasizes the importance of the shoulder pain when the distension and pain in the abdomen make physical examination difficult or impossible. Splenectomy appears to be the method of choice in deep tears of the spleen, as the individual suffers no lasting damage in the removal of the spleen. This was proven by the case of a patient who had hardly recovered from a splenectomy, being severely burned in an explosion. As in severe burns large numbers of red blood corpuscles are destroyed, the regeneration of which takes place largely in the spleen, so it is proven by this case which recovered that the bone marrow may sufficiently compensate for the removal of the entire spleen even in cases where large numbers of red blood cells have been destroyed. This observation speaks strongly for the removal of the spleen in severe injuries of that organ. F. G. DYAS.

The Pathogenesis of Icterus. G. H. WHIPPLE AND J. H. KING. *The Journal of Experimental Medicine*, vol. xiii, No. 1, p. 115.

This experimental study deals with the pathogenesis of obstructive jaundice and was undertaken by the authors with the hope of throwing some light on the mechanism of escape of the bile pigments from the bile capillaries and the appearance of the same pigments in the urine. The justification for such a study is apparent when we review the work done during the past few years and note the widely varying results of different investigators. Many explain the escape of bile from the liver in obstructive jaundice by the activity of the lymphatic apparatus, while others uphold the view that this process is essentially an absorption of bile from the liver by the activity of the hepatic capillaries. To clear up this question, the authors undertook this series of experiments. They attempted to simulate as closely as possible the conditions found in acute obstructive jaundice, and then permitted the animals to live for some time and made careful observations upon the lymph and urine. After an interval of days or weeks they examined the animals for the presence of bile pigments in the various body fluids. They believed such experiments, extending over a long period of time, are more valuable than shorter ones in which no aseptic precautions were taken, and in which the animal was sacrificed at the end of a few hours. The method which they employed was briefly this: Under ether anæsthesia the common bile duct was ligated doubly and cut and the thoracic duct was exposed, tied at its junction with the internal jugular vein, and into it a glass canula was inserted. The urine and lymph were then examined at stated intervals.

Their experiments seem to indicate clearly that, in obstructive jaundice, the bile which escapes from the liver is absorbed by the hepatic capillaries and carried by the blood to the kidneys. Apparently the presence of a thoracic duct fistula influenced in no way the development of icterus after total obstruction of the common bile duct. It was proven that bile pigments, sufficient to give a Salkowski test, may or may not appear in the lymph of the thoracic duct in such experiments, their appearance possibly depending upon the rapidity of bile secretion and the amount of lymph flow. These animals developing a chronic icterus with a thoracic duct fistula gave an interesting distribution of bile pigments in the body fluids. The lymph and pericardial fluid contained the same amount, which was much less than the content of bile pigment in the blood serum and urine. It seemed clear to the authors that in both acute and chronic obstructive jaundice the lymphatic apparatus takes no essential or active part in the absorption of bile pigments from the liver. At best, the lymphatic system is a secondary factor in the mechanism of jaundice.

GEORGE E. BEILBY.

The Action of Placenta Serum and that of the Pregnant Woman on Carcinoma Cells (Über die Wirkungen des Plazentarserums und des Serums Gravider auf Menschliche Karzinomazellen). KRAUS AND GRAFF. *Wien. klin. Wchnschr.*, 1911, xxvi, 191.

By testing the serum of the woman in the tenth month of pregnancy and the placenta serum in their action on the carcinoma cells of mouse tumors, the investigators showed that the ability of these sera to dissolve the carcinoma cells was reduced to the same degree as is that from a carcinoma patient, while it was reduced far below that of normal sera or of the serum from the first nine months of pregnancy. C. G. GRULEE.

The Treatment of Varicose Veins of the Leg with the Spiral Incision (after Rindfleisch-Friedel) [Zur Behandlung des varikösen Symptomenkomplexes mit dem Spiralenschnitt (nach Rindfleisch-Friedel)]. DR. PAUL KAYSER. *Beiträge zur Klin. Chir.*, b. lxviii, h. 3, p. 802.

The Trendelenburg operation of ligation of the internal saphenous vein is the most popular of the radical measures adopted for the treatment of varicose veins of the leg. This operation, however, is likely to be successful in those cases only, in which the valves of the deep veins are competent. This question can be determined by the Trendelenburg test. Much of the operating heretofore, including excisions and circular incisions, has resulted in failure to cure varicose veins.

Rindfleisch and Friedel in 1908 devised an operation which had for its object the obliteration of all of the subcutaneous veins of the leg, by interrupting each vein at many different places. A spiral incision was made extending from the ankle to the knee, and encircling the leg six to seven times. Kayser describes his technique and reports eighteen cases, all of the worst type. Under general anæsthesia, and after the Grossich iodin skin preparation, the leg is suspended by the foot and a constrictor applied around the thigh. The internal saphenous vein is ligated high up, thereupon a spiral incision is made, beginning on the dorsum of the foot, and encircling the leg six to twelve times, the number of spirals increasing with the extent of the varicosities. Two or three parallel incisions on the dorsum of the foot are said to prevent the occurrence of edema. If ulcers are present, the incisions skirt the borders, but are carried right through if the ulcer is a large one. In depth the incision reaches to the fascia, and the larger venous trunks are ligated, after removing the constrictor. The incision is not sutured, but is left open to granulate and cicatrize. The wound is packed with gauze and the leg kept elevated.

Postoperative hæmorrhage has never been of any consequence. After the wound has begun to granulate, nitrate of silver stick is frequently applied, so as to secure a deep firm scar. The patients were allowed to be up in one month. The effect on pre-existing ulcers was often such that the ulcers would be healed before the incision. The size of the leg diminished and remained so afterward. There were no sensory disturbances of the skin and Kayser says that his patients were well satisfied with the results of the operation.

WILLIAM HESSERT.

Cultivation of Tissues *in Vitro* and Its Technique. ALEXIS CARREL AND MONTROSE T. BURROWS. *The Journal of Experimental Medicine*, vol. xiii, No. 3, page 387.

The authors define a tissue culture as a plasmatic medium inoculated with small fragments of living tissues. It is essentially characterized by an active growth of the cells from the original fragment into the plasmatic medium. Epithelial or connective tissue cells wander out in great numbers from the tissue into the coagulated plasma, where they undergo direct or indirect cell divisions. They cover a wide area of the medium and are often very closely packed. They grow during a period of time which varies from five or six days to more than twenty days, without any evidence of necrobiosis. The cells which have wandered into or have been born in the plasmatic medium, can be transplanted into a fresh medium and produce a new and very luxuriant generation of cells. A culture transplanted into the body of an animal can take and grow rapidly. There is no growth of cells when serum is used instead of plasma as a culture medium.

These characteristics, the authors state, distinguish the culture of tissues from the phenomenon known as the survival of cells. The idea of cultivating tissues as previously defined is very far from being new. They record many experimenters who have already thought of the possibility of growing tissues outside of the body, and several of these have attempted to develop adequate methods for it. But the attempts have apparently always met with failure. It seems certain that the cultivation of tissues outside of the organism was accomplished for the first time by Harrison, in the Anatomical Department of Johns Hopkins University. In 1907, Harrison demonstrated in a series of experiments that embryonic tissue of the frog, transplanted into coagulable lymph, will develop normally. At this time, Carrel was engaged in the study of the laws of redintegration of the tissues of mammals, and he therefore resolved to use for this purpose the method of Harrison after it had been adapted to the culture of mammalian tissues. After some important modifications of the method, the authors first succeeded in September, 1910, at the Rockefeller Institute, in cultivating *in vitro* adult tissues of mammals. The technique was rapidly improved as to details and the result became practically uniformly positive. They first used the culture method of Harrison, that is, of small pieces of tissue suspended in a hanging drop of plasma. Afterwards they developed a method of culture on a plate, which permitted them to grow large quantities of tissue. Many interesting facts were developed. It was found that almost all the adult and embryonic tissues of dog, cat, chicken, rat and guinea pig could be easily cultivated *in vitro*. According to their nature, these tissues generate connective or epithelial cells, which grow into the plasmatic medium in continuous layers or in radiating chains. They observed the direct division of the nuclei during the life of the cells and many karyokinetic figures in the fixed and stained cultures. Other experiments showed that the life *in vitro* of the tissues, which varies from five days to about twenty days, can be prolonged by secondary and tertiary cultures, and that a second generation of thyroid, splenic, and sarcomatous cells can be obtained from cells which have developed outside the body. They also succeeded in cultivating malignant tissues such as the Rous chicken sarcoma, the Erlich and Jensen sarcoma of the rat, a primary carcinoma of the breast (dog), and two human tumors, a sarcoma of the fibula and a carcinoma of the breast. Very recently they have applied the method of cultivation of tissues *in vitro* to several problems of the redintegration of normal tissues and of the biology of malignant tumors. One of their collaborators found that fragments of skin with a small open wound in the center undergo *in vitro* a process resembling normal cicatrization. They describe in detail the technique for the cultivation of tissues and append nine plates showing photographs of living cultures.

GEO. E. BEILBY.

Our Knowledge of Diseases of the Pancreas Obtained from the Study of Several Cases (Zur Kenntnis der Krankheiter des Pankreas im Anschluss an einige Falle). OLOF LUNDBLAD. *Nord. Med. Arkiv.*, 1911, afd. 1 (Kirurgi), Festschrift for J. Berg, Nr. 7.

All the cases reported had been operated upon. Of four cases of hæmorrhagic pancreatitis two recovered. Of two necroses one recovered, one died after two months. One case of chronic pancreatitis died and two of traumatic pseudocystitis recovered. Lundblad thinks that the indications in these cases is for drainage of the abdominal cavity, the capsule of the pancreas at times being split. Chronic pancreatitis is very hard to diagnose.

C. G. GRULEE.

The Use of the Blunk Hemostatic Forceps for Permanent Hemostasis (Über die Verwendbarkeit der Blunk'schen Blutgefaessklemme zur definitiven Blutstillung). DR. H. PETZSCHE. *Beiträge zur klinischen Chirurgie*, bd. lxviii, h. 3, 724.

The forceps invented by R. Blunk, a veterinary surgeon of Wesel, supplies a valuable addition to the technique of hemostasis without ligature. Stoppenbeck first described this instrument in December, 1908. It resembles a pair of scissors with short blunt blades curved on the flat, and is furnished in different sizes and lengths. The application of the instrument on a vessel does not result in the crushing bite of an angiotribe, but the scissors like action of the blades results in a division of the inner and middle coats, which curl up, while the outer coat remains intact. In numerous animal experiments Petzsche invariably found the intima and media divided and retracted, being curled up in such a way as to plug the vessel completely. The adventitious coat never seemed to be divided.

While the forceps is intended for small and medium sized vessels, Petzsche has demonstrated its reliability by employing it on the femoral artery in a thigh amputation, with no secondary hæmorrhage. The instrument, it should be remembered, is not so well suited for use on veins on account of their relatively large lumen, and absence of contractility. Bleeding from small veins, however, can be safely arrested.

The author tabulates 100 operations to show the small number of ligatures used and the good results which were thus obtained. In 25 hernia operations only three vessels were tied, and a Pirogoff amputation was performed without using any ligature.

In employing the forceps, the vessel should be clamped transversely to obtain the best effect. The blades are closed slowly and held for a few seconds before slowly and carefully releasing the grasp. The instrument can be applied as well to small bits of tissue containing a bleeding point as to an isolated vessel. The forceps may be applied either directly to the bleeding point, or the vessel may be first grasped in the jaws of a hemostat. Thus, as the operation proceeds, bleeding vessels are caught up with ordinary artery forceps, and before closure of the wound, instead of applying ligatures, the vessels are crushed proximal to the artery forceps, whereupon the latter is released. The Blunk forceps is not adapted for use in dense or tough tissue, nor should too much tissue ever be included in the bite. Atheramatous vessels are obviously not safely closed by this method. The advantages claimed for the forceps are, first, the avoidance of buried ligature material, and second, the element of time saved in operating. Petzsche predicts that this instrument is destined to find a permanent place in the armamentarium of the surgeon.

WILLIAM HESSERT.

Iodine Sterilization for Laparotomy Field. DR. AROZTEGUI. *Revista de la Sociedad Medica Argentina*, June, 1910.

Dr. Aroztegui reports the use of iodine applied according to the Grossich method without previous use of soap and water in 150 laparotomies with the following results:

In 123 cases closed without drainage, 118 healed without pus, 95.93 per cent; the remaining 5 suppurated to a greater or less degree.

In 27 cases the abdomen was drained; these finally healed as well as under the older method of cleansing the field.

In vaginal work the method was also tried but soon abandoned as the following disadvantages were noted:

1. The difficulty of reaching all parts of the wrinkled and folded surface of the vagina.
2. The discoloration of the mucous membrane making the landmarks hard to recognize.
3. The shrinking action on the mucous membrane.

B. J. O'NEILL.

Ileus, Volvulus and Incarceration of the Stomach (Magenileus, Volvulus und Inkarceration). J. A. HEDLUND. *Nord. Med. Arkiv.*, 1911, afd. 1 (Kirurgi), Festschrift for J. Berg, Nr. 9.

This consists of the report of two cases and the collection of seventeen from the literature. The gastric volvulus is probably often caused by overfilling of the stomach and increased peristalsis. Epigastric hernia of course plays a part. Volvulus may be divided into three classes: First, volvulus of the whole stomach; second, volvulus of the pyloric portion of an hour-glass stomach; and third, volvulus of a portion of the stomach in connection with an internal hernia. The diagnosis is not difficult as a rule. The onset is sudden without forewarning, frequently after a heavy meal. Pain is intense and in the stomach region. Abdominal tumor is present. Tetanic symptoms may be present. As to the treatment slight degrees of the disturbance may heal spontaneously, in others laparotomy, with both transverse and longitudinal incision, may be necessary to save life.

C. G. GRULEE.

BOOK REVIEWS

LIPPINCOTT'S NEW MEDICAL DICTIONARY. By Henry W. Cattell, M. D. Philadelphia and London: J. B. Lippincott Company, 1910.

A new and complete dictionary of the terms used in medicine and the allied sciences with their pronunciation, etymology, and signification, and including much collateral information of a descriptive and encyclopædic character.

The author states that the aim of this work is to furnish the medical student, the practitioner of medicine, the laboratory worker and whoever has occasion to use a medical dictionary, with a single volume of moderate compass and at a reasonable price, which shall attain the ideals of the user in regard to thoroughness, accuracy, perspective, and proportion, and general suitability to the year 1910.

Typographically the work is up to the usual standard of the Lippincott books, is of a convenient size, bound in flexible leather, and in every way should be a welcome addition to the physician's library.

EPOCH MAKING CONTRIBUTIONS TO MEDICINE, SURGERY, AND THE ALLIED SCIENCES. Collected by C. N. B. Camac, M. D. Philadelphia and London: W. B. Saunders Company.

In the introduction of this extremely interesting book the author says: "In the mass of scientific literature which appears year after year there occurs, very occasionally, an article which presents the results of experiment or investigation that prove epoch making. These articles though recording masterpieces of scientific research, are buried with valueless or ephemeral writings. Certain of my teachers, in presenting a subject at clinics and lectures, had, for the inspection of the students, the article which communicated such observations as first placed the subject upon a sound scientific basis. Subsequently, in my own teaching I followed this custom. There has thus resulted a collection, begun some twelve years ago, of epoch making articles, a part of which is gathered into the present volume."

The subjects considered in this volume are: Antisepsis, circulation of the blood, percussion of the chest, auscultation and the stethoscope, vaccination against smallpox, anæsthesia, and puerperal fever.

Under antisepsis appears a portrait and autograph letter of Lord Lister with a preliminary epoch making paper on the antiseptic principle of the practice of surgery, followed by a list of Lister's writings.

Under circulation of the blood, the same scheme is carried out substituting William Harvey for Lord Lister. This chapter also contains a facsimile of the title-page of the 1628 edition of the Exercitatio Anatomica.

Under vaccination is included a biographical sketch of Edward Jenner. Under anæsthesia is given a biographical sketch of William T. G. Morton, a portrait of Horace Wells, and one of J. C. Warren, together with various epoch making contributions on the subject of anæsthesia.

Under puerperal fever, we find a list of Holmes' writings; also Semmelweis's writings, with date of birth and death of the latter.

BISMUTH PASTE IN CHRONIC SUPPURATIONS; ITS DIAGNOSTIC IMPORTANCE AND THERAPEUTIC VALUE. By Emil G. Beck, M.D. St. Louis: C. V. Mosby Co., 1910.

This book about the uses of bismuth paste is at hand and it retains all the interest of the primal paper, which the reviewer was fortunate enough to hear, and is also able to excite the interest still further by other uses to which it has been adapted. Its value as an aid in an anatomical diagnosis where a fistula is concerned, cannot be underestimated, as with a very simple technique one is able to force the paste to the very root of the trouble, which can be plainly shown with a skiagram, and in that manner relieve sinus work of most of its terrors. As to its therapeutic effect, one must be careful to follow the author with the greatest exactness in order to obtain the best results. That it has a marked beneficial effect cannot be doubted. In the treatment of spondylitis and other extensive cavities, it is well to remember that it should not be injected too soon after the abscess is opened, as the walls are still soft and too great a quantity may be given and cause trouble. Later on the walls become hard and firmly contracted and it is in this class of cases that this paste is the most successful. In renal fistulæ, caused by tuberculosis of the kidney, the author reports several successful cases, but this is still in the embryonal stage. The toxicity of the paste is carefully considered and should be one of the first chapters read, so that errors may be avoided.

As a whole, the book, with its great number of beautiful illustrations and clear type, is a credit to the author and the publishers, and it seems to me to fill a long-felt want. WILLIAM R. CUBBINS.

CLINICAL CONGRESS OF SURGEONS OF NORTH AMERICA

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Second Annual Meeting, Philadelphia, November 7 to 16, 1911

PHILADELPHIA COMMITTEE ON ARRANGEMENTS

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THE NEXT CONGRESS

ORGANIZATION of the next Congress has proceeded far enough to give us a forecast of its scope and success.

The unanimity of co-operation of the surgeons, the medical schools (both graduate and under-graduate) and all the large hospitals of Philadelphia, insures a series of clinics that it would be difficult to duplicate anywhere, while the capacity of the operating rooms and amphitheatres will accommodate comfortably about eighteen hundred observers at one time.

The evening literary sessions under the auspices of the County Medical Society, the College of Physicians, the Academy of Surgery, the Pediatric Society, the Obstetrical Society, and the Neurological Society (the organized societies of Philadelphia), each with a comprehensive surgical program; together with the large Presidential evening meeting (partial program of which herewith appears) will constitute a series of six surgical meetings of the most interesting nature to surgeons.

The hotels of Philadelphia are so located that little time need be consumed by those in attendance in reaching any of the important clinics or the evening meetings from the headquarters in the Bellevue-Stratford, where the daily programs will be bulletined.

The committee has furnished a list of the principal hotels which is published in this issue. Surgeons contemplating attending the November meeting should reserve their hotel accommodations by applying directly to the hotels as soon as they have decided upon the days they expect to be in Philadelphia.

The Congressional and Senatorial Representatives have been prompt in accepting the appointments of the Executive Committee. This body of surgeons, including as it does a distinguished man from each Congressional district in the United States and each Parliamentary district of Canada, with two representatives at large, known as Senatorial representatives, from each State of the United States and each Province of Canada, will constitute a body of medical men, which, if co-operative, will wield an influence on any important question of interest to the medical profession that it is difficult to overestimate.

While the clinical feature as the paramount one in the conduct of a medical meeting of large proportions is a new one in medical organizations, the idea has taken root with a spontaneity that argues powerfully for its need. Judging from the enthusiastic letters received by the General Secretary from many parts of the Continent, the Philadelphia Clinical Congress of Surgeons will be the most important meeting of surgeons in point of attendance and material shown, that has ever been held.

EVENING LITERARY SESSIONS

IN LATER ISSUES THE NAMES OF SPEAKERS AND OTHER INFORMATION WILL BE ADDED AS THE WORK OF THE COMMITTEE PROGRESSES

Wednesday, November 8th

PHILADELPHIA COUNTY MEDICAL SOCIETY — In Mitchell Hall, College of Physicians, at 8:15 P. M.

SURGERY OF THE UPPER ABDOMEN

1. Surgical Pathology of the Stomach and Duodenum . J. F. BINNIE, M. D., Kansas City, Missouri.
   Discussion opened by W. L. RODMAN, M. D., Philadelphia.
2. Surgery of the Liver and Bile Ducts . . . GEORGE EMERSON BREWER, M. D., New York City.
   Discussion opened by ROBERT G. LECONTE, M. D., Philadelphia.
3. Surgery of the Pancreas . . . . . MAURICE H. RICHARDSON, M. D., Boston.
   Discussion opened by JOHN B. DEAVER, M. D., Philadelphia.

Thursday, November 9th

PRESIDENTIAL ADDRESS — In the Ball Room of the Bellevue-Stratford, at 8:15 P. M.

Co-ordination of Undergraduate and Postgraduate Teaching of Clinical Surgery . . . . . ALBERT J. OCHSNER, M. D., Chicago.

The Technique and Remote Results of Blood-vessel Anastomoses. . . . . ALEXIS CARREL, M. D., New York City

Friday, November 10th

PHILADELPHIA NEUROLOGICAL SOCIETY — In Mitchell Hall, College of Physicians, at 8:15 P. M.

Alcoholic Injections into the Gasserian Ganglion,. . . . . HUGH T. PATRICK, M. D., Chicago.
Discussion to be opened by F. X. DERCUM, M. D., Philadelphia.

Surgery of the Pituitary Body . . . . . HARVEY CUSHING, M. D., Baltimore.

Experimental Fracture and Dislocation of Spinal Column and its Operative Treatment, with Demonstrations . . . . . A. REGINALD ALLEN, M. D., Philadelphia.
Discussion to be opened by CHARLES H. FRAZIER, M. D., Philadelphia.

Monday, November 13th

PHILADELPHIA ACADEMY OF SURGERY — In Mitchell Hall, College of Physicians, at 8:15 P. M.

Some Observations on the Thyroid Gland and Its Diseases, CHARLES H. MAYO, M. D., Rochester, Minn.

The Operative Treatment of Fractures . . . . . JOSEPH A. BLAKE, M. D., New York City.

The Significance of Blood in the Stools . . . . . J. M. T. FINNEY, M. D., Baltimore.

Tuesday, November 14th

PEDIATRIC SOCIETY OF PHILADELPHIA — In Mitchell Hall, College of Physicians, at 8:15 P. M.

THE SURGERY OF CHILDHOOD

1. Pyloric Stenosis in Infancy, its Surgical Treatment (Lantern demonstration) . . . . . CHARLES L. SCUDDER, M. D., Boston.
2. Some Differences between the Surgery of Children and Adults . . . . . CHARLES N. DOWD, M. D., New York City.
3. A paper on Orthopedic Surgery, Speaker to be announced later.

Wednesday, November 15th

OBSTETRICAL SOCIETY OF PHILADELPHIA — In Mitchell Hall, College of Physicians, at 8:15 P. M.

Surgery of the Tubes and Appendix.

Ectopic Gestation.

Surgery of the Fibroids.

COMBINED MEETING OF THE SECTIONS ON OTOLOGY, LARYNGOLOGY AND OPTHALMOLOGY
In Cadwalader Hall, College of Physicians, at 8:15 P. M.

Surgery of the Sinuses.

Relations between Otitic and Intracranial Diseases.

The Newer Operations for Glaucoma . . . . . JOHN E. WEEKS, M. D., New York City.

On one of the evenings not yet definitely selected but probably either Wednesday or Thursday, the 8th and 9th respectively, the Pathological Society of Philadelphia will prepare an exhibit relating especially to surgical diseases which have been discussed or are to be discussed during the Congress.

PHILADELPHIA HOTELS AND THEIR RATES PER DAY

HOTELS A, American; E, European.	One Person		Two Persons	
	Without Bath	With Bath	Without Bath	With Bath
BELLEVUE-STRATFORD, Broad and Walnut Sts...E	$2.50 up	$3.50 up	$3.50 up	$ 4.50 up
RITTENHOUSE, 22nd and Chestnut Sts.....E	1.50 "	2.00 "	2.50 "	3.00 "
RITTENHOUSE, 22nd and Chestnut Sts.....A	4.00 "	4.50 "	7.50 "	8.00 "
ST. JAMES, 13th and Walnut Sts.....E	2.00 "	2.50 "	3.00 "	3.50 "
WALTON, Broad and Locust Sts.....E	2.00 "	3.00 "	3.00 "	4.00 "
ALDINE, 1914 Chestnut St.....E	2.50-5.00	3.00-5.00	3.50- 6.00	4.00- 6.00
ALDINE, 1914 Chestnut St.....A	4.00-6.00	5.00-6.00	8.00-10.00	10.00-12.00
CONTINENTAL, 9th and Chestnut Sts.....E	1.50 up	2.00 up	2.50 up	3.00 up
NEW BINGHAM, 11th and Market Sts.....E	1.50 "	2.50 "	3.00 "	4.00 "
COLONNADE, 15th and Chestnut Sts.....E	1.50 "	2.00 "	2.50 "	4.00 "
LORRAINE, Broad St. and Fairmount Ave.....E	1.25 "	1.50 "	2.50 "	3.00 "
LORRAINE, Broad St. and Fairmount Ave.....A	3.50 "	.....	.....	.....
RODMAN, 800 North Broad St.....E	.....	1.50 "	.....	3.00 "
NORMANDIE, Chestnut and 36th Sts.....A	3.50 "	4.00 "	6.50 "	7.50 "
GREEN'S, 8th and Chestnut Sts.....E	1.00-1.50	2.00 "	1.50-2.00	3.00 "
STENTON, Broad and Spruce Sts.....E	1.50 up	2.50 "	2.50 up	4.00 "
MAJESTIC, Broad St., above Girard.....E	2.00 "	2.50 "	3.00 "	4.00 "
HANOVER, 12th and Arch Sts.....E	1.00 "	1.50 "	2.00 "	2.50 "

THE CLINICAL PROGRAM

PRELIMINARY OUTLINE OF THE CLINICS, WHICH WILL BE REVISED EACH MONTH UNTIL COMPLETE

JEFFERSON HOSPITAL

ORVILLE HORWITZ and HIRAM R. LOUX	Genitourinary clinic; alternate days; 1 to 2 P. M.
W. F. HANSEL and WILLIAM M. SWEET	Eye clinic; Nov. 8, 9 and 10; 2:30 to 4 P. M.
J. CHALMERS DA COSTA and CHARLES F. NASSAU	Surgical clinic; Nov. 8, 10, 13, and 15; 1 P. M.
JOHN H. GIBBON	Surgical clinic; Nov. 7, 11, and 14; 1 to 3 P. M.
H. AUGUSTUS WILSON	Orthopedic clinic; Nov. 7, 9, 11, 14, and 16; 10 to 11 A. M.
E. E. MONTGOMERY and J. M. FISHER	Gynecological clinic; daily; 9 to 11 A. M.
S. MCCUEN SMITH	Otological clinic; Nov. 8, 10, 13, and 15; 1 to 2 P. M.
EDWARD P. DAVIS	Obstetrical clinic; daily; 4 to 5 P. M.
D. BRADEN KYLE	Laryngological clinic; Nov. 7, 9, 11, 14 and 16; 1 P. M.
WILLIS F. MANGES	X-ray clinic; daily; 1 to 2 P. M.

PENNSYLVANIA HOSPITAL

W. E. LEE	Surgical technique of the hospital. Surgery of the peritoneum; acute, localized, and diffuse inflammations; tubercular peritonitis. Cystoscopic examinations. Fractures and dislocations. Nov. 7, 13 and 15, 10 A. M.; Nov. 13, 3 to 4 P. M.
ROBERT G. LE CONTE	Tubercular glands of the neck; goiter. Surgery of the female perineum. Acute inflammations of bone. Nov. 7, 11 to 1; Nov. 11, 12 to 1; Nov. 16, 11:30 to 1.
DRS. PACKARD and COATES	Surgery of the ear, nose and throat. Nov. 7, 2 to 4.
FRANCIS A. PACKARD	Surgical diseases of the ear. Nov. 15, 2 to 4.
W. T. LONGCOPE	Surgical pathology. Nov. 8, 10 A. M.
JOHN H. GIBBON	Hernia; inguinal, femoral, umbilical. Malignant diseases; tumors of the breast. Surgery of the kidney, ureter and bladder. Nov. 8, 11 to 1; Nov. 13, 11:30 to 1; Nov. 15, 11 to 1.
DRS. SCHWENK and SHOEMAKER	Surgery of the eye. Nov. 8 and 13, 2 P. M.
DRS. ALLEN and ASHHURST	Fractures and dislocations. Nov. 9 and 10, 10 A. M.
EDWARD B. HODGE	Traumatic surgery of the lung. Club foot and tendon transplantation. Nov. 9, 11:30 to 1; Nov. 16, 10 to 11:30.
FRANCIS T. STEWART	Surgery of the heart and pericardium; thoracic aneurysm. Surgery of blood-vessels. Nov. 9, 2 to 4; Nov. 14, 11:30 to 1.
ARTHUR E. BILLINGS	Surgery of the female pelvis. Nov. 10, 11:30 to 1.
DRS. EVES and SCARLET	Surgery of the ear, nose and throat. Nov. 10, 2 to 4.
CHARLES F. MITCHELL	Surgery of the intestine; typhoid perforations. Surgery of the upper abdomen. Nov. 11 and 14, 10 A. M.
CHARLES N. DAVIS	Surgical diseases of the skin. Nov. 14, 2 to 4.

MEDICO-CHIRURGICAL HOSPITAL

ERNEST LAPLACE	Surgical clinic; Nov. 7 and 11; 11 to 1 P. M.; Nov. 13 and 15; 9 to 11 A. M.
H. M. CHRISTIAN	Genitourinary clinic; Nov. 8 and 15; 11 A. M. to 1 P. M.
W. L. RODMAN	Surgical clinic; Nov. 8, 10, 14 and 16; 9 to 11 A. M.
J. P. MANN	Orthopedic clinic; Nov. 9 and 14; 11 to 12 A. M.
W. E. ASHTON	Gynecological clinic; Nov. 9 and 14; 12:30 to 2 P. M.
L. W. FOX	Eye clinic; Nov. 10 and 13; 1 to 3 P. M.
E. B. GLEASON	Otological clinic; Nov. 10 and 15; 3 to 4 P. M.
S. C. BURNS	Oral surgical clinic; Nov. 11; 9 to 10 A. M.
G. M. BOYD	Obstetrical clinic; Nov. 13; 12 to 1 P. M.
A. H. CLEVELAND	Nose and throat clinic; Nov. 16; 12 to 2 P. M.

HOSPITAL OF THE UNIVERSITY OF PENNSYLVANIA

C. H. Frazier	Clinical demonstrations. Laboratory demonstrations.
Edward Martin	Open treatment of fractures. Urinary calculi. Vasa-epididymostomy.
B. A. Thomas	Results of cases treated, and a demonstration of dessication by the monopolar high frequency current of surface growths and hollow viscera neoplasmata, benign and malignant.
G. G. Davis	Treatment of tuberculous disease of hip and spine; congenital luxation of hip; paralysis from anterior poliomyelitis; operations for ankylosed and flail joints.
T. T. Thomas	Shoulder injuries, two new operations.
John B. Deaver	Operations on the appendix, stomach and gall passages.
George Fetterholf	Clinical anatomy of thorax.
E. H. Siter	Genitourinary technique.
A. A. Uhle	Renal insufficiency.
W. H. Mackinne	Urethroscope.
John L. Laird	Cystoscope and catheterizing ureters.
Alfred C. Wood and E. E. Eliason	Instruments: (*a*) Demonstration of a tourniquet for the control of hæmorrhage from the scalp during operations on the skull or brain. (*b*) Osteoplastic resection of the skull by means of an instrument operated by hand. Technique: A method of exposing the spinal laminæ.
J. B. Carnett	Hernia: with operations, inguinal, femoral, and umbilical. Typhoid perforation and treatment.
C. C. Norris	Treatment of sterility and dysmenorrhœa by means of a new form of stem pessary. Review of all cases o latter condition. Gonorrhœa in women.
Barton Cooke Hirst	Technique of hysterectomy for various indications; vaginal and abdominal hysterectomies; operative treatment of obstructed labors and placenta prævia; repair of the genital canal.
W. R. Nicholson	Methods of intrauterine bacteriological examination.
R. Tait McKenzie	Treatment of flat foot, round shoulders, lateral curvature, or hernia, by exercise.
H. K. Pancoast	Stereoscopic work.
George E. de Schweinitz and J. T. Carpenter	Surgery of the eye.
T. B. Halloway, Carl Williams and H. Maxwell Langdon	Demonstration of special methods of diagnosis.
J. E. Sweet and Edward Martin	Open treatment of fractures. Arterial suture. Vascular anastomosis.
George P. Muller	Demonstration of patients operated upon for various joint lesions: tuberculous arthritis, ankylosis, rheumatoid arthritis, etc. Demonstration of certain malpositions and anomalies of the gastrointestinal tract with special reference to ptosis. Effect of salt solution, introduced intravenously, upon hæmolysis. Demonstrations in surgical pathology.
C. P. Grayson	Demonstration of correction of deflections of the nasal septum, with local, followed by general anæsthesia. Tonsillectomy versus tonsillotomy. The intranasal surgery of the accessary sinuses.
B. A. Randall and Ralph Butler	Radical tympanomastoid exenteration for middle ear caries. Surgical anatomy of the temporal bone. (Demonstration with specimens and lantern.) Diagnostic tests in otologic practice. The best every day treatment of chronic catarrhal and suppurative ear disease.
Brooke M. Anspach	Perineal operations with adaptation of subcuticular suture.
Floyd E. Keene	Diagnosis of renal tuberculosis.
John G. Clark	Surgical phases of enteroptosis and other current clinical material.

JEWISH HOSPITAL

W. H. Teller, E. L. Klopp, L. W. Steinbach and Dr. Stern	Surgical clinics.
E. L. Klopp and S. M. Smith	Otological clinics.
A. W. Watson	Laryngological clinics.
W. G. Elmer	Orthopedic clinics.
Isaac Leopold and J. C. Knipe	Ophthalmological clinics.

POLYCLINIC HOSPITAL

B. F. Baer	Gynecological clinic. Nov. 7 and 14, 2 P. M.
L. H. Adler	Rectal clinic. Nov. 7, 1 P. M.; 13, 2 P. M.
J. M. Baldy	Pelvic inflammatory disease. Uterine displacements and fibroid tumors. Nov. 9 and 16, 10 A. M.
John B. Roberts	Surgical clinic. Demonstration of plastic operations on cadaver (laboratory). Plastic surgery of the face, exhibiting operations and results. Nov. 9 and 16, 11 A. M.
J. B. Roberts and L. W. Steinbach	Surgical clinic. Nov. 11, 11 A. M.
F. R. Packard	Nose and throat clinic. Operations on the accessary sinuses. Demonstration in tracheobronchoscopy. Nov. 8 and 15, 3 P. M.
G. M. Dorrance and N. Ginsberg	Demonstration of transfusion methods (laboratory). Nov. 10, 10 A. M.
G. M. Dorrance	Demonstrations in operative gynecology (laboratory). Nov. 10, 3 P. M.; Nov. 16, 1 P. M.
R. Butler	Demonstration in operative surgery of the ear and mastoid (laboratory). Nov. 8 and 15, 4 P. M.
W. Reber	Ophthalmological clinic. Nov. 8, 1 P. M.
E. L. Vansant	Nose and throat clinic. Submucous operations for deviation of the nasal septum. Nov. 8 and 15, 12 M.
J. A. Kelly	Demonstration in surgical pathology. Nov. 9, 1 P. M.; Nov. 13, 12 M.
J. F. Schamberg	Dermatological clinic. Exhibition of cases of lupus and skin cancer treated by X-ray and other methods. Treatment of angiomata and other nævi by solid carbon dioxide. Nov. 7 and 11, 12 M.
A. Hewson	Demonstration in regional and surgical anatomy. Nov. 7, 3 P. M.; Nov. 14, 12 M.
L. W. Steinbach	Surgical clinic. Surgery of the thyroid gland. Nov. 7 and 14, 11 A. M.
J. H. Jopson and J. Speese	Surgical clinic. Treatment of pulmonary tuberculosis by nitrogen injections. Nov. 8, 11 A. M.
J. H. Jopson	Surgical clinic. Nov. 15, 11 A. M.
C. L. Leonard	Demonstration in X-ray laboratory. Rapid stereoroentgenology. Nov. 7, 4 P. M.; Nov. 11, 1 P. M.; Nov. 14, 3 P. M.
A. A. Sargent	Demonstration in refraction. Nov. 7 and 14, 10 A. M.
W. Roberts	Aural clinic. Nov. 8 and 15, 2 P. M.; Nov. 13, 1 P. M.
William R. Nicholson	Gynecological clinic. Cystoscopy and ureteral catheterization. Nov. 8, 11 and 15, 10 A. M.
M. B. Miller	Surgical clinic. Hernia. Demonstration in operative surgery. Methods of intestinal anastomosis (laboratory). Nov. 10 and 13, 11 A. M.
J. K. Young	Orthopedic clinic. Diagnosis and treatment of infectious arthritis. Tendon transplantation for infantile paralysis; Lange's operation. Nov. 9 and 16, 2 P. M.
A. W. Watson	Nose and throat clinic. Nov. 9 and 16, 3 P. M.
W. M. Sweet	Ophthalmological clinic. Ocular injuries by foreign bodies. Nov. 10, 1 P. M.
W. M. Sweet and C. R. Heed	Demonstration in operative ophthalmology (laboratory). Nov. 11 and 15, 1 and 4 P. M.
J. P. Tunis	Demonstration in operative surgery of throat and nose (laboratory). Nov. 11, 3 P. M.; Nov. 16, 4 P. M.
B. A. Thomas	Genitourinary clinic. Chromoureteroscopy, demonstrating carmine test. Intravenous use of salvarsan. Functional kidney diagnosis by the Duboscq colorimeter. The Wasserman technique. Nov. 10 and 14, 4 P. M.
W. C. Posey	Ophthalmological clinic. Nov. 9, 4 P. M.
M. B. Miller, R. M. Goepp and J. A. Kelly	Arteritis obliterans. Exhibition of patients and specimens. Nov. 10, 12 M.
J. Thorington	Refraction. Nov. 10, 2 P. M.
G. M. Coates	Aural clinic. Nov. 11, 2 P. M.
J. S. Gibb	Nose and throat clinic. Tonsillectomy by modern methods. Nov. 13, 3 P. M.
G. H. Makuen	Faulty operations on the tonsils, and their effect on the soft palate and the voice. Nov. 13, 4 P. M.
T. Erck	Gynecological clinic. Nov. 14, 1 P. M.

PHILADELPHIA GENERAL HOSPITAL

Wilmer Krusen	Obstetrical clinic; November 7, 11 to 1 P. M.
H. M. Christian	Genito-urinary clinic; November 7, 2 to 4 P. M.
Walter Roberts	Laryngological clinic; November 7, 4 to 6 P. M.
H. A. Wilson	Orthopedic clinic; November 8 and 10, 9 to 11 A. M.
Joseph W. Hearn	Surgical clinic; November 8 and 15, 11 to 1 P. M.
E. H. Siter	Genito-urinary clinic; November 8, 2 to 4 P. M.
George E. de Schweinitz	Eye clinic; November 8 and 15, 4 to 6 P. M.
J. B. Carnett	Surgical clinic; November 9, 9 to 11 A. M.
W. J. Roe	Oral surgery clinic; November 9 and 16, 11 to 1 P. M.
M. B. Hartzell	Dermatological clinic; November 9, 2 to 4 P. M.
Ernest Laplace	Surgical clinic; November 9, 4 to 6 P. M.
George P. Muller	Surgical clinic; November 10, 9 to 11 A. M.
Frank D. Dickson	Orthopedic clinic; November 10, 11 to 1 P. M.
E. P. Davis	Gynecological and Obstetrical clinic; November 10, 2 to 4 P. M.
J. C. Knipe	Eye clinic; November 10, 4 to 6 P. M.
Henry Tucker	Genito-urinary clinic; November 11, 9 to 11 A. M.
L. W. Steinbach	Surgical clinic; November 11, 11 to 1 P. M.
M. P. Warmuth	Surgical clinic; November 11, 2 to 4 P. M.
W. M. Sweet	Eye clinic; November 11, 4 to 6 P. M.
William L. Rodman	Surgical clinic; November 13, 9 to 11 A. M.
M. H. Cryer	Oral surgery clinic; November 13, 11 to 1 P. M.
M. B. Miller	Surgical clinic; November 13, 2 to 4 P. M.
B. M. Anspach	Gynecological clinic; November 13, 4 to 6 P. M.
T. T. Thomas	Surgical clinic; November 14, 9 to 11 A. M.
Ella B. Everitt	Obstetrical clinic; November 14, 11 to 1 P. M.
H. R. Loux	Surgical clinic; November 14, 2 to 4 P. M.
Alexander Uhle	Genito-urinary clinic; November 14, 4 to 6 P. M.
George M. Boyd	Obstetrical clinic; November 15, 9 to 11 A. M.
R. C. Norris	Obstetrical clinic; November 15, 2 to 4 P. M.
H. K. Gaskill	Dermatological clinic; November 16, 2 to 4 P. M.
Hershey Thomas	Surgical clinic; November 16, 4 to 6 P. M.

SAMARITAN HOSPITAL

Wilmer Krusen	Gynecological clinic. Nov. 8, 11 and 15; 12 M.
Guthrie McConnell	Demonstration of the surgical pathology of malignant tumors. Nov. 8, 2 P. M.
Collier Martin	Rectal clinic. Demonstration of results obtained in the treatment of fistula in ano. Nov. 8 and 15, 3 P. M.
W. Wayne Babcock	Surgical clinic with demonstration of segment anæsthesia by intradural injection. Demonstration of plastic or reconstructive surgery. Nov. 8 and 15, 4 P. M.; Nov. 11, 3 P. M.
Harry G. Duncan	Demonstration of cystoscopy and ureteral catheterization. Nov. 9, 1 P. M.
Nathan G. Ward	Use of high frequency currents and static wave current in the treatment of diseases of nos and throat. Nov. 9, 2 P. M.
Harry Hudson	Orthopedic clinic. Nov. 9, 4 P. M.
William H. Hitschler	Ear, nose and throat clinic. Demonstration of excision of the facial and pharyngeal tonsils. Nov. 10, 3 to 4; Nov. 13, 2:30 P. M.
William E. Robertson	Surgical errors in the diagnosis of intra-abdominal disease. Nov. 10, 4 P. M.
A. Parker Hitchens	Preparation of bacterial vaccines. Application of bacterial vaccines and allied products in surgical therapeutics. Nov. 10, 5 P. M.; Nov. 15, 2 P. M.
C. E. de M. Sajous	The rôle of the ductless glands in relation to surgical therapeutics, Nov. 11, 2 P. M.
William A. Steel	Genitourinary clinic, Nov. 13, 4 P. M.
J. F. Schamberg	Strerepticon demonstration of syphilis with special reference to the newer therapy. Nov. 13, 5 P. M.
Wendel Reber	Ophthalmic operative clinic. Nov. 14, 3 P. M.

KENSINGTON HOSPITAL

H. C. Deaver	Gynecological clinic; November 9 and 13, 2 to 5 P. M.

WOMAN'S HOSPITAL OF PHILADELPHIA

SARAH H. LOCKREY	Gynecological clinic; November 7 and 16, 10 A. M.
EMMA E. MUSSON	Yankauer's Eustachian Tube work; November 7, 2 P. M. Bronchoscopic and Esophageal Tube work; November 14, 2 P. M.
CAROLINE M. PURNELL	Gynecological clinic; November 8 and 15, 10 A. M.
MIRIAM BUTT	Eye clinic; November 8 and 15, 2 P. M.
KATE W. BALDWIN	Surgical clinic; November 9, 10 A. M. Beeswax in Bone Cavities and in Cavities of the Soft Tissues; November 11, 2 P. M.
MARY W. GRISCOM	Obstetrical clinic; November 9, 1 P. M.
MARIE K. FORMAD	Panhysterectomy; November 10, 10 A. M. Gynecological clinic; November 14, 10 A. M.
MARGARET F. BUTLER	Submucous Resection; November 10, 2 P. M. Removal of Tonsils and Adenoids; November 13, 2 P. M.
CATHARINE MACFARLANE	Cystoscopy and Bier's Hyperemia; November 11, 10 A. M.
FRANCES R. SPRAGUE	Surgical clinic; November 13, 10 A. M.
MARY GETTY	Eye clinic; November 16, 2 P. M.

HOWARD HOSPITAL

BARTON COOKE HIRST	Treatment of Pelvic Inflammation and Plastic Operations. Technique of Hysterectomy and Hysterotomy; November 9, 11 and 16, 12:30 to 3 P. M.
GEORGE B. WOOD	Nose and Throat clinic; November 14, 2 to 5 P. M.

HOSPITAL OF THE WOMAN'S MEDICAL COLLEGE

ELLA B. EVERITT	Gynecological clinic. Nov. 7, 9, 14 and 16, 1 P. M.
MARGARET F. BUTLER	Laryngological and rhinological clinic. Nov. 8 and 15, 2 P. M.
HARRY C. DEAVER	Surgical clinic. Nov. 10, 1 P. M.
EMMA E. MUSSON	Aural clinic. Nov. 13, 2 P. M.

GERMAN HOSPITAL

JOHN B. DEAVER	Surgical clinic every other day.

GYNECEAN HOSPITAL

J. M. BALDY	Supravaginal hysterectomy with anchorage of the cervix to the round ligaments in connection with plastic operations for uterine prolapse. Suspension of the uterus by posterior attachment of the round ligaments. Hysterectomy for carcinoma of the cervix. Hysterectomy for fibroid tumor of the uterus. Nov. 8 and 13, 10 A. M.
HENRY D. BEYEA	Suspension of the stomach for gastroptosis by plication of the gastrohepatic omentum. Supravaginal resection of the uterus for fibroid tumor, with conservation of a part of the endometrial cavity and the ovaries. Nov. 9, 10 A. M.
THEODORE ERCK	Suspension of the kidney. Hysterectomy for pelvic inflammatory disease. Nov. 10, 10 A, M.
BROOKE M. ANSPACH	Cystoscopic examination and catheterization of the ureters. Vesicovaginal interplacement of the uterus for cystocele and prolapse. Resection of excessive fat from the abdominal wall in connection with operation for ventral hernia. Nov. 11, 10 A. M.
GEORGE W. OUTERBRIDGE	Demonstration of interesting gynecological specimens. Nov. 14, 10 A. M. Demonstration of specimens removed at each operation and other specimens bearing on cases of the day, daily.

EPISCOPAL HOSPITAL

H. C. DEAVER	Surgery of the female pelvis. Nov. 7, 2 to 4 P. M.
LOUIS MUTSCHLER	Surgery of hernia. Nov. 8, 2 to 4 P. M.
T. R. NEILSON	Surgery of the urinary tract. Nov. 9, 2 to 4 P. M.
G. ORAM RING	Surgical diseases of the eye. Nov. 10, 2 to 4 P. M.
CHARLES H. FRAZIER	Surgery of the stomach and duodenum. Nov. 11, 2 to 4 P. M.
C. Y. WHITE	Vaccine therapy. Nov. 13, 2 to 4 P. M.
C. C. BIEDERT	Surgical diseases of the ear, nose and throat. Nov. 14, 2 to 4 P. M.
A. P. C. ASHHURST	End results of fracture of the femur. Nov. 15, 2 to 4 P. M.
J. L. BROMLEY	Surgical diseases of the eye. Nov. 16, 2 to 4 P. M.

CHILDREN'S HOSPITAL

H. R. Wharton	Surgical clinic. Nov. 7.
F. R. Packard	Nose and throat clinic. Nov. 8.
B. A. Randall	Ear clinic. Nov. 9.
J. H. Jopson	Surgical clinic. Nov. 10.
W. C. Posey	Eye clinic. Nov. 11.
E. B. Hodge	Surgical clinic. Nov. 13.
F. K. Knowles	Surgical skin affections. Nov. 14.
J. A. Babbitt	Nose and throat clinic. Nov. 15.
C. Y. White	Surgical pathology. Nov. 16.

PRESBYTERIAN HOSPITAL

George Strawbridge	Surgery of the eye. Nov. 7, 2 to 4 P. M.
W. S. Newcomet	X-ray therapeutics. Nov. 7, 2 to 4 P. M.
John H. Girvin	Gynecological clinic. Nov. 8, 2 to 4 P. M.
H. R. Wharton	Surgical clinic. Nov. 9, 2 to 4 P. M.
George Erety Shoemaker	Gynecological clinic. Nov. 10, 2 to 4 P. M.
D. B. Pfeiffer	Surgical pathology. Nov. 10, 2 to 4 P. M.
E. B. Hodge	Surgical clinic. Nov. 11, 2 to 4 P. M.
John H. Jopson	Surgical clinic. Nov. 13, 2 to 4 P. M.
George C. Stout and A. H. Cleveland	Ear, nose and throat clinic (surgical). Nov. 14, 2 to 4 P. M.
Frank C. Knowles	Surgical diseases of the skin. Nov. 14, 2 to 4 P. M.
William D. Rodman	Surgical clinic. Nov. 15, 2 to 4 P. M.
Richard F. Woods	Gynecological clinic. Nov. 15, 2 to 4 P. M.

METHODIST EPISCOPAL HOSPITAL

J. B. Roberts	Surgical clinic. Nov. 7, 12 to 2; Nov. 14, 11 to 2.
Joseph Spellisy	Surgical clinic. Nov. 9 and 16, 11 to 12 A. M.
J. T. Rugh	Orthopedic clinic. Nov. 8, 10 and 13, 11 to 12 A. M.
Walter Roberts	Otological and laryngological clinic. Nov. 9 to 16, 1 to 4 P. M.
L. T. Hammond	Surgical clinic. Nov. 8, 10 and 13, 12 to 2 P. M.
J. P. Moore	Ophthalmological clinic. Nov. 9 and 16, 4 P. M.
R. C. Norris	Gynecological clinic. Nov. 14, 2 P. M.
L. A. Salade	Gynecological clinic. Nov. 13, 2 P. M.

ST. JOSEPH'S HOSPITAL

J. M. Spellisy	Surgical clinic, Nov. 7, 9, and 14; 1 P. M,
M. M. Franklin	Surgical clinic, Nov. 7, 9, and 14; 9 A. M.
C. F. Nassau	Surgical clinic, Nov. 7, 9 and 14; 3 P. M,
E. E. Montgomery	Gynecological clinic, Nov. 7, 10 and 14, 11 A. M.
P. B. Bland and F. H. Maier	Gynecological clinic, Nov. 8, 9, 11, 13, 15 and 16; 11 A. M.
S. L. Ziegler and P. J. Pontius	Ophthalmological clinic, Nov. 8, 10 and 15, 4 P. M.
Dr. Jones	Ophthalmological clinic, Nov. 9, 11, 14 and 16, 4 P. M.
G. M. Marshall	Ear, nose and throat clinic, Nov. 7, 8, 11, 14 and 15, 9 A. M.
Dr. Senders	X-ray clin.c. Daily at noon.

JOSEPH PRICE PRIVATE HOSPITAL

Joseph Price	Gynecological clinic every other day.

PHILADELPHIA LYING-IN HOSPITAL

G. M. Boyd and Stricker Coles	Obstetrical clinics.

WILLS EYE HOSPITAL

P. J. Pontius, M. Radcliffe, S. L. Ziegler, C. Berens, S. D. Risley, F. Fisher, W. C. Posey, P. N. K. Schwenk and W. Zentmayer	Operative clinics daily; 2 to 3 P. M.

END